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NEBRASKA

State Horticultural Society

ESSAY ON

FOREST GROWING,

By J. T. ALLAN.

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Essay on Forest Growing.

THE DEMAND FOR FORESTS.

The great and increasing demands of the West call to-day for the advancement of those interests in which lie the foundations of its wealth and progress, and among these the subject of covering the treeless prairies with timber is one of vast importance. How much the influence of forests has to do with our growth and prosperity, what duty and profit are combined in growing timber, and how to commence a work which is to be carried on to the end of time, is the question of the hour.

As the world becomes physically more perfect and beautiful, in the same ratio it becomes morally better. To increase this proportion is the work of the Horticulturist. Science has its army of workers, whose brain power is a mighty element in the world's progress, but without Agriculture the great driving wheels of commerce and navigation would stop. We have to see what part forests take as connected with the physical forces of civilization, and how much this State owes to the cause.

The forests of the country, which are well nigh gone, have furnished an untold amount of wealth. What shall be done for the future? The great tide of emigration which has been moving west for a hundred years has crossed the Missouri, as the influx of settlers into this State the present year attests, and in no way can we enrich the State more than by urging every one to plant trees for timber, and to plant largely.

To enter into this subject as it deserves would require more space than the needs of the present require, and while each part of the subject has been noticed as the Society demands, the main object will be to offer some practical suggestions and information, which, it is hoped, will be of advantage to those who intend to plant forests, and by showing the great wants of both the present and future, awaken the people of the State to the duty they owe themselves and their children.

WASTE AND SUPPLY.

Consider the fact that on the day the Pilgrims landed the destruction of forests commenced, and with the increase of population the destructive waves have increased, until they have swept over the whole land from the Atlantic to the Mississippi, and during these one hundred and fifty years the people have been eagerly and earnestly engaged in wasting and destroying the best timber region on the continent to prepare the land for cultivation. In the rich valleys of New York and Pennsylvania, and from the Ohio to the Lakes, where once stood noble forests, we see now only waving fields of grain, orchards and pastures, and people calling for supplies of timber, while their crops are meagre, compared with those sections which have the benefits of forest protection.

Maine, which furnished such large quantities of lumber twenty years ago, has ceased to export. Maple, walnut and hickory have almost disappeared from New York, and the Andirondack region is the only timbered section of the State Wisconsin furnishes an example of the rapid waste of forests. The amount of lumber cut in that State in 1871 was 1030 millions. Many of these logs were rafted down the Mississippi, and the river towns of Iowa manufactured 185 million feet. Young & Co., of Clinton, Iowa, who have a mill running 200 saws, tell me that three-fourths of this lumber finds a market in Kansas and Nebraska, a strong argument why these States should now commence to plant for a future supply. Fifty thousand acres were stripped to obtain the above mentioned quantity in Wisconsin alone. So we may safely say that ten years from now the present forests will be swept away. One tract of the finest timber on the continent remains comparatively untouched; consisting of about one-half of Washington Territory and one-third of Oregon. Here we find in its native glory the magnificent yellow fir, (Abies Douglassii,) three hundred feet in height. Here will be the great centre of the ship building interest, and exportation has already commenced to

China and Japan. California has about five hundred thousand acres, one-third of which was cut away the past year, but fully aware of the future necessity for timber, has commenced plantations of a rapid growing tree of Australia.

RAILROADS

Are drawing on our forests more heavily than any other branch of industry. The present roads of the United States require 150 millions of ties, which have to be replaced every seven years; using generally young trees sufficient to make one or two ties each, and requiring a large area to furnish such an immense number.

The large amount of land annually brought into cultivation, (logged and burned,) is an astonishing item. From 1860 to 1870 thirty-five millions of acres were improved, and we may safely estimate that one-half was timbered lands, making an annual decrease of forests of three and one-half million acres, which, with the amount used for lumber, would make a grand total of 7 to 8 millions of acres cut away in 1871.

The annual demand increases yearly at the rate of twenty-five per cent., and Chicago may be cited as an example of the great demand of the West. In 1871 there was received there nearly twenty-five hundred millions of feet, and ten thousand acres were stripped to furnish the wood for fuel.

West of the Mississippi there is a vast tract of country, containing nearly a million and a half square miles, which we may say is devoid of timber. This country, comprising 400,000 more square miles than that from which the forests have been cut away, is soon to be filled up as the tide of emigration sweeps westward. Without a supply can be obtained from new forests, which should be planted now, the want will be severely felt.

FENCES.

Fences are so large a drain upon our forests that I feel like enlarging upon this topic, believing that it is of advantage to our farmers to impress upon them the necessity of saving timber, which has a practical bearing upon production.

The late Illinois State report says "the fences of the United States cost more than any other class of property, except real estate and rail roads; the total amount being estimated at 1800 millions of dollars, with an annual expense of ninety-eight millions for repairs." This State, as set down in the reports of the last census, has two millions invested in fences, 60 per cent of which is of boards and post and rail, the balance wire, hedge, &c.; costs one hundred and seventy-five thousand dollars annually for repairs. It is satisfactory to learn that our fences cost less per rod than any other State, and that we have a less number of rods, compared with the amount under cultivation, being 400 rods to each 100 acres. The expense of repairs is necessarily more in a prairie State, where a supply of timber must be imported.

Cannot the farmers of the State, within three years, spare one-half of her fences, to the value of a million of dollars, hedge their farms, and transfer that amount of dead capital, which pays no interest on the investment, to forest growing which will realize a larger per cent of profit than any crop of cereals. Let every farmers' club in each county look at this in its true light; see if division fences cannot be spared, and see how much their interests will be advanced by less fencing, more hedging, more permanence and more beauty.

The question how to save, as well as how to produce, is all important, whether in the great pine forest, where so much is burned and wasted, or on the prairies where annual fires keep the groves from spreading. A picture might be drawn, which would be recognized as true to life, of the farmers in Eastern States, who have cut down every tree in commencing a farm, and when acquiring a competence, after years of toil, built a comfortable mansion and planted trees about it, tho' they could scarcely expect to enjoy the comfort of their shade. This is a lesson to the new beginner on the prairie, and tells him to plant NOW. Three years will build a wall of defence from the biting winds of winter; five years will give an abundant shade about the dwelling, and a supply of fuel.

CLIMATE AND INFLUENCE.

A question of importaece and one which in solution is little known or considered, is, why is the climate so dry on the plains in the western part of this State? This has a practical bearing on the necessity of forests.

The great current of warm and moist air, which rises from the Pacific, passes over California, and striking the Rocky Mountains is condensed and precipitated in snow on their summits. Leaving the mountains these winds are perfectly dry, sweeping over the high plateaus, dancing along under a burning sun with a dazzling mirage, and drying up the grasses of the plains, searching for moisture to replenish their stock, which is not found until they pass over the Missouri and Mississippi, and furnish rain for Illinois and Wisconsin.

Seven hundred miles of the coast of Peru, and a large tract of country in India, suffer for the want of rain from the same cause that affects western Nebraska.

Evaporation of course increases according to the dryness of the atmosphere, and is a cooling process. The amount of moisture thrown off by plants is much greater than is generally supposed, a Peach tree having been found to give off eighteen pounds, or over two gallons, in twelve hours. Forests would have a great tendency to increase the humidity of the atmosphere about them. Any tract of country is less affected by heat when wet than when dry, and, consequently, a greater equalization of temperature.

Meteorologists, who have watched the effects of forests on rain-fall, recommend the planting of trees at the extreme limit, where there is sufficient rain to support them, and extend the planting as the rain increases. So, if we commence largely, say 200 miles west of the Missouri river, I believe the planting might be pushed westward until the whole western part of the State will be, through the influence of forests, covered with a rich growth of grasses, sufficient to support millions of cattle.

The effects of denuding countries of forests have been witnessed in many instances. In Germany the Elbe has lost 18 per cent. of its flow in consequence of the cutting away of the trees on its banks, and exposing its waters to the hot sun, and consequent increased evaporation. One-third of the Island of Santa Cruz, in the West Indies, which twenty years ago was a garden of fertility, is now a desert, and the people ascribe this result to the cutting away of the forests.

EFFECT ON RAIN-FALL.

The obstruction of the dry currents, mentioned above, by forests retards their flow and elevates them until a point of condensation is reached. One prominent effect of forests is to prevent radiation, consequently in the region of forests, in summer, the air is cooler, and clouds passing over them are more easily condensed. Philosophers claim that electricity has much to do with rain-fall, and that trees being charged with negative electricity attract the positively charged clouds, and rain is the result. We find, also, the benefits of forests as retainers of moisture. Contrast the effects af a sudden and heavy fall of rain in an open country, where it sweeps away crops and buildings, and one covered with timber, where a large amount is absorbed as it falls, and stored away for future use, as nature demands. Snows melt more gradually and freshets are rare. The planting of strips of willows in ravines on our prairies would do away, to a great extent, with the deep gullies, which are often seen where the land is broken, and prevent its washing.

LEGISLATIVE AID.

This subject demands the aid of both National and State Legislatures, and its recent agitation in Congress, through Senator Hitchcock's bill, has called attention to it all over the country. Agricultural Societies should see that such aid is given as will most help along the work; that the settler is protected by law from those reckless persons who would endanger his trees through prairie fires, or allow their cattle to roam and destroy the labors of the pioneer.

The present plan of a large exemption from taxes is very exceptionable, and it will be found that it is not a good policy to pay a man for doing what it is his interest to do. One thing should be done at once, and that is to commence the growing of young trees on the Model Farm, which should be distributed throughout the State, to each County Agricultural Society, with directions for planting. Info-mation should be furnished by the person in charge in regard to all matters relating to timber growing, and where and how anything the planter may want can be obtained at the best of rates. By this means at a small expense thousands of dollars might be saved to the farmer.

The State farm should be carried on as an experimental institution, not for its profit, but for the value of the information obtained, and here the students in the Agricultural College should learn both the theory and practice of foresting. France and Germany, years ago, were aware of the dangers of a timber famine, and established schools for the special purpose of teaching how the forests might be renewed. Our facilities for the same kind of education in our Agricultural College and State farm, are ample, and we hope soon to have graduates from these institutions, whose skill and experience will be of great benefit to the State.

In California a bill has been presented creating a State Forester, and although the idea may seem new to many, still, upon consideration, it will be found that the advantages above mentioned will be of great benefit to the country.

TREES ALONG THE HIGHWAYS.

One feature in tree growing, which we trust will receive proper attention at an early day, is the planting of trees along the highways. Nothing would add so much to the beauty of a prairie landscape as avenues of lofty trees and hedge rows. In a country where our roads need so little labor to keep them in repair it would seem advisable to expend a portion of the road tax under the direction of the overseers of highways in planting trees on each side of public roads. These, in summer, would be the resort of thousands of our insectivorous birds, the value of which, to an agricultural region, has not been overestimated, and their growth and protection should be encouraged. The grateful shade the trees would afford would be appreciated by every traveler, and growing, as they would, on land which would otherwise waste or grow up with weeds, the return from the only expense, planting, would be certainly most satisfactory. At present, if nothing else could be had, we would say plant Cottonwood on account of its rapid growth, but as soon as possible set between them hard Maples, to ultimately take their place. The fine form of this tree, with its close, symetrical head, and clean foliage, makes it the most desirable tree we can find for street planting, and one which, no doubt, will grow rapidly on our rich prairies. Next come the Elms, Ash, and

Box Elder, each of which are valuable for this purpose, and make a fine effect if interspersed with an occasional Basswood and Sycamore. Although these remarks about highway planting may not be considered as directly belonging to forest growing, still, while we plant largely for profit, we should not neglect to add to the beauties of the landscape, and we hope, and believe, that the spirit evinced by our farmers on Arbor day will make every highway a grand avenue, lined with glorious forest trees.

TREES FOR FOREST PLANTING.

WHITE ASH.

The White Ash, (Fraxinus Americana,) for the rapidity of its growth on the prairie soil, the excellent quality of its wood and increasing demand, places it in the front rank among our forest trees. Its strength, elasticity and durability makes it invaluable for the manufacture of agricultural implements, and from present appearances the supply will be exhausted before another crop can be grown

Practical results being of most importance, I have learned from Wm. Hollenbeck, of Douglas county, who has about 200 acres of timber of various kinds, surrounded with a perfect hedge, that his Ash trees planted, while seedlings, in 1861, now measure twenty-six inches and are thirty feet in height.

Where planted closely they grow very straight, free from lower limbs and early arrive at a size suitable for many farm purposes and manufacturing.

Here I wish to introduce the experience of Mr. Budd, of Iowa, a reliable tree grower, whose statements are worth volumes of theory. He says a grove of ten acres thinned to six feet apart, containing 12,000 trees, at twelve years were eight inches in diameter and thirty-five feet high, the previous thinning paying all expenses of planting and cultivation. Ten feet of the bodies of these trees were worth, for making bent stuff, &c., 40 cents each, and the remaining top ten cents, making a total of $6,000 as the profit of ten acres in twelve years, or a yearly profit of $50 per acre. If the stumps of such a tract are cut low and a light furrow turned over them, with proper trimming, the sprouts will produce a like crop in eight years.

Mr. Budd also estimates that ten acres planted with Black Ash, (Fraxinus Sauebueifolia,) for hoop poles, in rows four feet apart and one foot in the row, will at the first cutting, at the end of five years, yield, at three cents each, $1,620. The remaining half, or 54,000, two years later, at the price of large poles, (6 cents,) will yield for the ten acres $4,860. These calculations he says were made from actual experiments.

A New England paper in advocating the value of this tree for manufacturing purposes says one Ash tree there made 3,000 rake handles, and compares their value with the cost of growing the tree.

The seeds of the Ash are very abundant at an early age and easily gathered, which should be done after the first frost. Sow in rows two feet apart, in the fall. Cover with an inch of soil, and three inches of straw or litter. This should be removed early in the spring, as the plants will push out almost as soon as the frost is out of the ground, and make a growth of twelve to eighteen inches the first year, and the next three feet. Should recommend planting four feet apart when one year old, in ground deeply plowed and clear of weeds. With all seedlings great care is needed to keep down the weeds, one crop of which takes more from the ground in one year than the trees in three.

THE WALNUT.

The Walnut has always been a prominent tree among forest planters, and its popularity is on the increase as its wood grows so rapidly in demand. The nuts should be planted as soon as they fall, four feet apart and three inches deep. The first year they will make a growth of ten to twelve inches, the next 30, and the third they will be of sufficient size to render cultivation unnecessary. The first two years the ground might be cultivated with some crop. This tree, striking a deep root, is not liable to obstruct cultivation, consequently would be advisable for division fences. At one or two years it can be transplanted with general success in which case the tap root is generally shortened to induce a growth of roots which spread out near th surface and this may account for its early maturity. Mr. Hollenbeck reports that a fair average of a tract of forty acres planted in the spring of 1865, measured 22 inches in circumference and 25 feet high. Some of them bore nuts in 1869, and quite a number produced a peck or more in 1871.

Our soil is admirably adapted for the growth of the Walnut, the main root striking down till it reaches the yellow sub-soil which is a depository of moisture. This may to some extent explain the luxuriant growth of our fruit trees and their tardiness in bearing. As soon as the roots find this reservoir, in connection with our rich surface soil, combining the elements of growth, they shoot up, producing strong terminal buds and spending their strength in the production of wood, which is rapidly formed from the large flow of sap consequent on the moisture at the roots. Confine the flow of sap in an apple tree by a ligature, and the growth is checked and a slower formation with fruit buds is the result.

This peculiarity of our soil might be an argument for planting the Oak, Walnut and other nut bearing trees, which draw their support from a locality independent of drouth. The number of nuts required to plant an acre, four feet apart, is three bushels, with the husks on, or 1½ if cleaned. The planting can be done rapidly, furrowing the ground both ways and dropping a nut at each intersection, covering with the plow. If the nuts cannot be planted in the fall they should be buried, and by no means allowed to dry. With proper care there will scarcely be a failure, and the farmer who plants a grove of even forty acres will realize, before ten years from this date, that the value of these trees for timber is vastly more than was anticipated.

SUGAR MAPLE.

The Sugar Maple deserves more attention than it has hitherto received in the West. Many persons who are familiar with its slow growth on the rocky hills of the Eastern States, hardly realize what it will do on the rich prairies, and in the vallies of our Western streams. Mr. Pinney estimates that an acre of Maples, at twenty-five years, one foot in diameter will produce 2,000 pounds of sugar annually. When the trees arrive at 20 inches they will give sixty thousand feet of lumber, worth at least $2,500, besides the fuel which will pay all expenses and interest. One peculiarity of this tree is that the body increases in size more rapidly in proportion than the top, and might be planted even closer than the number above estimated, which is only two hundred trees to the acre: The seeds ripen in October and should be planted the same as the Ash, though perhaps not quite so thickly in the seed bed, allow the plant to remain two years in the same place. By this time they have gained strong roots and can be transplanted with more certainty. We would urge the planting of this variety of the Maple both in plantations and as a shade tree.

SOFT MAPLE.

This variety of Maple we find in many parts of the State growing in its native state, along the streams and rich bottom lands, and as a general rule the tree in its uncultivated state presents anything but an elegant appearance, but when transplanted and grown closely its habits are much improved. Its success so far will always render it a popular tree for forest growing, and we have seen numerous groves of straight, well shaped trees of an average height of 7 to 8 feet at three years of age.

The State report of Iowa says that in Nonona county in that State Maple trees were grown, in seven years from the seed, large enough to make three ten foot rails from each tree and three thousand to the acre. The demand for the timber for manufacturing purposes will make it profitable for cultivation as it will reach a marketable size some years in advance of the Walnut.

Every farmer can and should be his own nurseryman for all trees he needs of this description. The seeds ripen here in June, and should be sown as soon as they fall, in ground well prepared by deep plowing, and harrowing thoroughly. Plant in drills an inch and a half deep, and rows twenty inches apart. In five or six days they will make an appearance and then all that is necessary is to keep down the weeds. The first season they will make a growth of 18 to 20 inches, and the following spring should be planted 2,700 to the acre, and will show growth of three or four feet the second year. When planted singly or in rows for shade trees, unless carefully trimmed and the ends of the side branches cut back, they will be likely to spread out and liable to be broken off by the high winds. This is not likely to occur in forest plantations where they grow more upright. We measured a specimen planted in 1861 which was 43 inches in circumference four feet from the ground. If the man had at that time planted 50 acres their value would have been a fortune, and is a lesson to our planters to-day.

ELMS.

The White Elm (Ulmus Americana) is one of the grandest forest trees of America. Its value is becoming more appreciated as the present supply decreases. The extensive use of this timber in manufactures has increased, to a great extent, within the last ten years, and the demand for articles for which it is used is immense. Plow handles, bent stuff, cheese boxes, chair stuff and many other articles are made from the White Elm. A forest planted here now, will, when grown of suitable size for use, furnish a large amount of material for the manufacture of articles which we now have to obtain from abroad. Both use and beauty are combined in the Elm. Every farmer has some place where he needs an avenue and no tree is more desirable than this. Its growth is rapid with finely formed and thickly growing head, not liable to be damaged by high winds nor infested with insects. Two specimens in Douglas county which were planted in 1859 now measure 34 and 36 inches four feet from the ground. In planting it for forest growth some tall growing tree should be planted alternately with it and cut away at the end of ten years leaving the Elms 8 feet apart, by this means they will gain straight, upright bodies. The remarks we have made in regard to sowing and cultivating the Soft Maple will apply to the Elms, their seed ripening at the same time, and are as easily grown.

RED ELM.

The Red Elm (Ulmas fulva) is found in its native state growing with great luxuriance on all our bluff timbered lands, in higher and dryer localities than the White, but never attaining the majestic proportions of the latter. As a shade tree it makes a finely formed head, and grows rapidly. The timber is much used for carriage manufacture, and is excellent for fuel. Trees we have seen planted here in 1861 are now nearly a foot in diameter. There is another thing to be mentioned about the Red Elm, and perhaps well to be considered in making forest plantations, and that is to secure varieties of trees which are not likely to be attacked by insects. We have seen, during the present season, several specimens of this tree attacked by an insect, which burrows under the bark, killing that part of the tree in every instance, and we may naturally look for this in trees which have sweet sap. The acid qualities of the juice in the White Elm renders it a much safer tree to plant, and its value for its various uses places it in advance of the red.

HONEY LOCUST.

The Honey Locust (Gleidetschia Tricauthos,) aside from its being one of the best and surest hedge plants we have, when grown as a timber tree is of great value. On the river bottoms of Illinois, trees can be found 80 to 100 feet high and four feet in diameter.

Dr. Warder. of Ohio, whose opinion must be regarded with deserving weight, coming, as it does from one of the first Horticulturists of the country, says: "This tree is very valuable on account of its rapid growth and the firmness and durability of its timber." He sold one acre of these fifteen years old for one thousand dollars. The wood was used for street paving and found very serviceable for that purpose. A tree in Omaha planted eleven years ago now measures 30 inches four feet from the ground and is about thirty feet high. This is the thornless variety and the one which should be used for forest planting. The thorns prove a great inconvenience in many respects and should only be found in hedges.

CHESTNUT.

The American Chestnut (Castavea Vesca) is a tree that furnishes more wood in a given time than any other of our forest trees and for this reason recommends itself to our planters. The question has been will it bear this climate, and this seems to be decided as there are several fine plantations already in the State and those we have seen were extremely thrifty and had made a most satisfactory growth. In Iowa they have proved very successful. A lot planted ten years ago at Mt. Pleasant are now making a better return in fruit than the same extent of orcharding. At Des Moines trees four years from the seed have borne fruit. For an original plantation we would set 4,000 trees to the acre and afterwards, by judicious thinning, reduce them to 300 or 12 feet apart; at that age they should bear half a bushel each. One special quality of this tree is its rapid reproduction. The sprouts from the parent tree, after being cut down, grow much faster than the original, furnishing excellent material for hoop poles, grape trellises, &c., and a crop may be cut off every twelve or fifteen years. Side hills, and any lands of the quality of Nebraska soil, which lie inconveniently for cultivation, will grow the Chestnut.

Care is necessary with the seed to prevent its rotting or mouldering during the winter. The sand, in which they should be kept, should be slightly damp, and in the coolest part of the cellar. Plant in the spring in rows three feet apart, and nuts 6 inches apart, covering them with an inch and a half of soil. The first winter as soon as the weather becomes cold the young plants should be protected with a covering of straw or litter, this will save the terminal bud. Where it is possible they chould be transplanted when one year old, which induces a growth of fibrous roots, and when two years old set out where they are to remain.

Many of our Nebraska farmers who once lived where this tree was common, at the East, could easily procure a supply of fresh seed at little cost, and knowing the value of the tree should not fail to give it a trial here.

BOX ELDER.

The Ash leaved Maple (Negundo Aceroides) is a native of this State, growing along the streams in rich bottom lands. Its hardiness, rapidity of growth and reproduction has made it a popular tree. When planted closely it loses the ragged, dwarf appearance it presents in its native state and will attain the height of 50 feet, with a straight, clear trunk. The seeds are produced in great abundance, but only about half of them can be relied on to germinate. When practicable they should be sown in the fall in shallow drills, covering an inch and a half, and protecting during the fall and winter with a light covering of straw to prevent their being beaten out of the ground by heavy rains. If kept during the winter they should be treated similar to the Ash. The growth the first year will be from 10 to 16 inches, and we have seen a nursery row at the end of the second year which were 5 to 6 feet high, and nearly an inch in diameter at the ground. Specimens that we have measured, eleven years old, were thirty inches in circumference and over thirty feet in height. As we may expect that at first those trees will be planted which will grow fast, and can be easily procured, the Box Elder will generally come into favor as one variety for a first crop, the only drawback being the possibility of an attack of the borer which in some localities have attacked it, but so far doing but little damage.

BIRCH.

The White Birch of Europe and the Canoe Birch of the United States, both growing in Northern latitudes to a large size, would without doubt prove very valuable for planting on our prairies. In some respects they resemble the Chestnut in growth, sending up strong and abundant shoots after the tree is cut down; excellent for fuel and valuable for cabinet work. In Northern Michigan the latter grows to a height of seventy feet. Bark white and tree highly ornamental. Seed could be easily obtained from Wisconsin, and we hope to see it tried. The ground for a seed bed should be a light sandy loam, and the seed covered lightly, sheltering the ground from the hot sun till the plants are two or three inches high.

HICKORY.

The nut bearing trees have always been considered the most valuable for timber, and among them the Hickory claims a place in the first rank. The older settlers of this State will notice that between the belt of timber bordering the Missouri river and the prairie there has sprung up in a very few years fine groves of this tree, mixed with Walnuts, Elms, &c., already of sufficient size for manufacturing purposes. In many places the Butternut predominates, but the wood is of better quality than that of Eastern growth, closer in the grain and possessing all the elasticity and strength of the best timber.

The shellbark (Carya alba) is the best for planting, either for its wood or fruit. For the latter purpose we are of the opinion that transplanting and cutting the tap root will cause an earlier crop, while for timber the nuts should be planted where the trees are to remain, four feet apart each way, and afterwards thinned as neeessity demands.

OAK.

The value of this tree for timber is so well known that it would seem unnecessary to urge those who have native timber already growing to take special pains to protect it from prairie fires, or those who intend to plant forests to give it due attention. The Burr Oak (Quer cus Macrocarpa) and the Yellow or Chestnut Oak (Quercus Castanea) are natives of this State, and among the most valuable of their species. From these seed can be readily obtained in October, which should be planted at once, or kept in a cool, moist condition till spring. Plant eight feet apart, and between the rows some other upright growing tree for nurses, as termed by European planters. The latter can be cut away when necessary.

COTTONWOOD.

The Cottonwood is an invaluable tree for the beginner in Nebraska. Young plants or cutting are easily procured, and almost certain to grow with little care and slight expense, furnishing shelter and fuel in a shorter time than another tree. Specimens are growing in Douglas county, which at thirteen years measure twenty-two inches in diameter, and a thousand of these might grow on an acre. One planter we met recently says he has a tract of several acres planted, which are seven feet high, from cuttings planted last spring, or six months ago. To those who are just making a beginning on the open prairie we would say plant a belt of the Cottonwood the first year if possible for a protection to a future orchard, and it will be certain to give a most profitable return. What is said concerning Willow cuttings will apply to the Cottonwood as regards the manner of planting.

WHITE WILLOW.

The White Willow (Salix alba) from its past success promises to be one of our most important trees. As a wind break, which can be grown rapidly for the protection of our farms both from the hot winds of summer and piercing blasts and driving snows of winter, its value is not overrated, and the most experienced forest growers of Illinois all speak strongly in its favor. This tree, when planted singly, attains a height of 60 or 70 feet and large size, but its value is most realized when planted in rows, for instance, on each side of the highway, the benefits of which the writer has more than once experienced in Nebraska. We know of several miles of Willow wind breaks, which, at the age of five years from cuttings, are a perfect fence fifteen feet high. One farmer in Douglas county has four miles, which he interlaced when two years old, and at four years it was a complete protection from storms and inroads of stock.

Cuttings of Willows are best made in the fall, tied in bundles, and burried in a dry place, covering with a foot of earth, or keep them in a cool cellar. As soon as the ground in the spring will permit, plow a deep furrow, setting the cuttings, (which have been cut 10 to 12 inches long,) against the land side, while a second man follows with a spade, filling in the earth and pressing it firmly with the foot. This is essential with all cutting, to bring the soil in as close contact as possible with the cuttings. Two inches is sufficient to leave above the surface; and with proper care in the preservation and planting, there should not be a loss of five per cent. Two years since we noticed the effects of a belt of Willows planted on the south side of an orchard at Nebraska City. A severe frost had occurred a few days before, damaging the fruit blossoms to a great extent. Along the side where the strip of Willows, 15 to 20 feet high, had protected the Peach trees from the hot wind and sun, the fruit was well set, while on the north side there was scarcely a show. The reason was that when the sun had its full power the temperature had been raised to such an extent that as soon as the cold air of evening set in that locality was the first to feel the frost.

As a specimen of the growth of the Willow when planted as a timber tree, Mr. Bratton, of Nemaha county, has shown a section of White Willow which measures 45 inches in circumference.

EUROPEAN LARCH.

Much has been said in the Horticultural journals of the west concerning this tree, both for and against, but on the start we will say that our faith in its value as a timber tree is unshaken, and we confidently predict its future popularity. Mr. Scofield, of Illinois, and other prominent forest growers, after a thorough trial in large tracts, speak unqualifiedly in its praise, as easy of culture and combining durability and adaptability to a variety of uses. On account of its upright growth it is estimated that one acre will produce as much timber as seven acres of Oak or Walnut, and the product for ties or posts will always be in demand.

To insure success we consider it essential to raise the plants as near as possible to where the forest is to be planted, one great source of failure in the past having been the bad condition in which plants were received when brought long distances. A pound of seed should produce thirty thousand good plants with the same treatment we have recommended for other coniferae. These should be transplanted as early as the ground will permit the following spring into rows, setting them six inches apart, and taking pains to prepare the ground thoroughly. When two years old they will have gained strong, fibrous roots, and should be transplanted again where they are to remain, not more than four feet apart. We consider Mr. Schofield's plan a good one, of planting pines 12 feet apart and filling the rest of the ground with Larch. At 15 to 20 years the crop of the latter will have been removed, yielding an average annual profit of at least $150 per acre, leaving a fine forest of straight, tall pines, which will at fifty years be worth fifteen thousand dollars. We have seen a tree grown in this State in Otoe county which at thirteen years is nearly a foot in diameter, and in a row of these trees in Douglas county, the average growth the past season was thirty inches. Sow the seed early, always transplant before the buds commence to open and Larch growing will be successful.

RED CEDAR.

The Red Cedar, a native of Nebraska, we find growing at the mouth of the Platte, on the islands and banks of that stream for its whole length, and among the clefts of the rocks at our western boundary. It accommodates itself to either wet or dry localities, and deserves the attention of all planters whether they seek protection or ament.

Immense quantities of this valuable timber were cut for piles, ties and fuel during the construction of the Union Pacific railroad. These trees have grown on land, to the observer at first sight, as sterile as the desert. Aside from its timber value, the purposes for which we would grow this tree is of more value to the farmer and fruit culturist. "Dr. Pinney says: "It is one of the densest of of our evergreens and the best tree to withstand the winds of winter and summer. To those who live in the Platte Valley nothing is easier to plant with success. The young trees can be procured almost its entire extent and if properly planted there will not be a loss of ten per cent. A tree taken by the writer from the low ground along the Platte and planted in a high and dry locality in 1858, is now over fifteen feet high, of a beautiful symmetrical form, which might have been improved by shortening in, as no tree bears the knife better.

In Wisconsin trees fifteen years old from seed are fifteen feet high. How grand a wind break of such trees would be stretched out by the mile along the highway or enclosing orchards. The seed germinates so slowly and require so much attention that the raising of young plants may safely be left with the professed nurserymen, who offer them so low by the thousand that every planter can afford to buy them.

EVERGREENS.

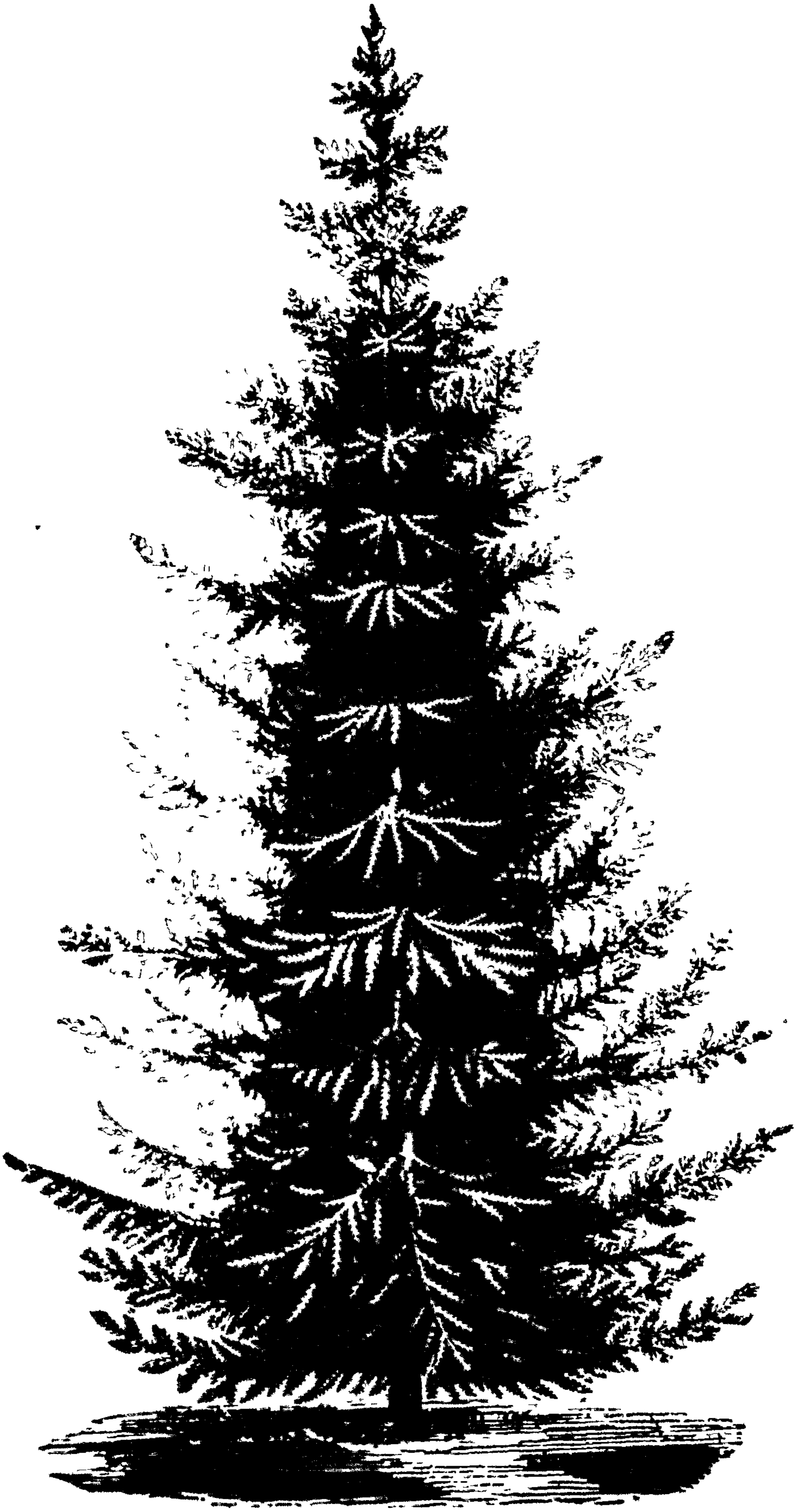
One feature noticed by many observing Eastern men is that we have but few Evergreens, and they might, with some reason, affirm that it is a lack of taste, which is not the fact. Until railroads reached the Missouri river our base of supplies was so far away and the risk so great that only here and there we see Evergreens of any size. Tree peddlers, a curse to any country, have brought trees carelessly packed, and sold them year after year, although perfectly dead, till the general complaint has been: "Evergreens won't grow in Nebraska." While the fact is our soil is well adapted and with proper handling they will grow as surely as any native deciduous tree.

Reliable tree growers are now offering young trees by the thousand at prices which are within the reach of almost every farmer, and every one should procure a stock of them at once. Any one desiring a large number can procure the seed and raise a large quantity by giving the proper care and attention. An essential point is the careful preparation of the seed bed. Common prairie soil should be well mixed with sand and the ground well pulverized. Whether the seed is sown in rows or broadcast the covering should be light and a screen of lath nailed on two boards six or eight inches wide placed on the bed at once. For convenience make the beds four feet wide, so that all parts can be easily reached for weeding. The screens keep the ground from becoming dry while the plants are coming up and shelter them from the hot sun which is liable to destroy them. Occasional showering is of great advantage during extreme and continued dry weather. In the fall they should receive a covering of leaves or straw for protection during winter. In the spring thin out, selecting the best plants and set them in nursery rows. Don't be discouraged at their slow growth for this is peculiar to Evergreens for two or three years. A pound of Wite Pine contains about 20,000 seeds, and a pound of Larch about the same number that will be likely to germinate. Although we have paid even this much attention to the propagating of Evergreens, we would advise for the present, at least, the procuring of young plants from professional growers, and save the time of three years growth. These after growing one year in rows will be of good size for planting where they are to remain.

Evergreens make the best screen and afford shelter at a time when most needed, while all other trees are bare. We have not space to speak of a long list of Evergreens, but only some of those which stand prominently as timber trees, and among the first is

THE WHITE PINE, (Pinus Strobus.)

This is the forest tree which has furnished us with vast quantities of lumber, the supply of which is decreasing so rapidly that special pains should be taken to provide for future wants, and this can be done now at a small expense. Twenty dollars will procure young trees, 12 to 18 inches high, sufficient to plant an acre. Set them eight feet apart, planting a row of Larch, or any other tall growing tree, between the rows of Pines, and setting the latter two feet apart in the row. Any low branching tree would be likely to interfere with the Pines and break off the terminal buds during high winds. The deciduous trees will draw up the Pines with straight, upright dodies, and, as usual, when planted closely, they soon lose their lower limbs, and at ten years of age present a straight, smooth trunk. In the meantime, as necessity required, you have been cutting away a crop of wood, till nothing but Pines remain, and at twenty years some of these will have to be removed, leaving 300 trees to the acre. We know of a Pine which has been planted fifteen years, which is now a foot in diameter, but being planted alone it is not more than 30 feet in height, but spread out with a large head. Mr. Schofield, of Illinois, from the rate of growth thus far in a tract of his own planting, calculates that in fifty years the White Pine will attain a height of 100 feet, with a diameter of at least two. The great forests of Wisconsin and Michigan are being cut away at an astonishing rate to supply the demands of an increasing population, which is spreading over the West, and with all the care and economy which can be exercised, in much less than the fifty years necessary to grow a new stock there will be a famine of Pine lumber.



NORWAY SPRUCE, (Abies Excelsa.)

NORWAY SPRUCE, (Abies Excelsa.)

Which is so highly prized as an ornamental tree. When planted for screens or belts it is only equaled by the Red Cedar. The State Horticultural Society of Illinois has recommended the planting of this tree as a protection for their orchards, and our fruit growers would find its advantages instead of planting deciduous trees. Its hardiness, rapidity of growth, and slight expense of cultivation highly recommends it, and for a windy country, or where ice and snow are liable to injure the trees, the elasticity and strength of the branches render them safe from damage. Planted in rows for screens eight feet is not too close, and for forest planting the same plan should be adopted as with the White Pine. Slips of Lombardy Popular might be grown to advantage among the Norways, and perhaps this is as good a purpose for which it could be used.

The wood is light and durable, excellent for flooring, ship-building and a great variety of uses. The Douglas Spruce which is known at Puget Sound as the Yellow Fir, growing to the height of two hundred feet, furnishes the best timber of the Pacific slope, and could be easily procured from the Rocky Mountains, where millions of small plants could be obtained, and the experiment of transplanting them having proved a success, we trust they will be introduced all over the State.

The Western Evergreens which have been so successfully transplanted from the Rocky Mountains by a committee of the State Horticultural Society, who visited that region last year and can now show ninety per cent of the trees in a good growing condition, suggests that in the future we may be able to plant at small expense, tracts of the Douglas Spruce and other valuable timber trees from that region which will, without doubt, succeed well in our rich prairie soil. The plants in some localities can be had in abundance, and in proper hands can be shipped without any danger of loss. While urging the planting of the White Pine, not only by acres, but by sections, we consider that the Spruce will prove as valuable a tree for timber, and add variety to the appearance of the plantation.

WHEN TO TRANSPLANT EVERGREENS.

The exact time when Evergreens should be moved has excited much discussion, and there is a wide difference of opinion as to the proper season. My experience after repeated trials is that just when the buds first begin to swell in the Spring was the time, while those removed after they had grown an inch were mostly failures. While a deciduous tree when planted is without leaves, an Evergreen is possessed of an abundance of foliage to give off evaporation. Just at the time mentioned the spongioles have commenced vigorous action, the resinous sap is thinned, and what is needed to secure a new growth is careful handling. See that the earth which should be in close contact with the roots, is finely pulverized, and avoid, by all means, giving too much water. To insure the growth of any tree a certain amount of warmth in the soil is necessary. This cannot be found when the planting is done early in the spring, and in consequence the fibers lose their vitality and are unable to draw the required nourishment. Advantage should be taken of cloudy days, when both roots and tops are not exposed to the hot sun or drying winds, and if the ground is moist sufficient water only is needed to settle the earth about the roots, and then mulching to some distance around the tree will retain the moisture and keep down weeds.

HOW TO COMMENCE PLANTING.

A farmer who can at the outset plant a strip say four rods wide, or more if possible, on the north and west sides of a quarter section has improved his land in the truest sense. The man of limited means may say I cannot afford it, but a slight calculation will show that aside from the breaking of the land the cost will be small. The above mentioned strip would contain fifteen acres, and, if planted with Cottonwood and White Willow, which can be easily obtained, would require about forty thousand cuttings. Plow the land deep and harrow well, marking it as for corn. A man with a spade inserts it the full length of the blade, at each intersection, without removing the earth, while a second inserts the cutting, and presses the earth firmly with the foot. In this way a large number can be planted in a day, and, as any one can see, at slight expense. Cultivate them for two years, and after that they will need no attention until the thinning process becomes necessary.

This same farmer may take a like quantity of land, crop it with the greatest care, expending as much yearly in labor and seed for ten years, as his tree crop cost for one; allowing for seasons when his wheat crop was a failure, although the tree crop was rapidly improving, and at the end of the time mentioned if he compares the value of the two products he will find his trees are worth, at a low estimate, 500 per cent. more than all he received for his grain. The forest-grower who possesses the means to plant the Walnut, Ash, &c., and can afford to wait a longer time for his return will, of course, have an increased profit, but the new settler wants something for protection and fuel which can be grown in the shortest time, and for this reason we mention the Willow and Cottonwood.

As this is not intended to be a work on forest growing, but has reference to what should be done in our State NOW, and the means requisite to accomplish the extensive growth of forest trees, the varieties recommended have been limited, and such as are within the reach of all. The farmer who has hundreds of acres under the plow, and the homesteader in his sod cabin are alike urged to plant, as well for the profit they will recieve as the great benefits which will accrue to the whole country. The man who plants an acre of Cottonwoods, or he who covers a hundred with Pines, will have each contributed their share to the wealth and beauty of the State. For those who seek a greater range of varieties, and those of an ornamental character. Mr. Bryant's "Forest Trees" gives all the information that is needed, in such a plain and practical manner that all can understand. In regard to the vast country west of us he says: "The practicability of growing timber in that region can scarcely be doubted since it seems certain that where grass will grow, trees may be made to grow also." As to how soon this very desirable object is to be attained much depends on the action of those who are striving to advance the growth of our State now, and none are doing more than those who are planting forests.

One of our American poets who was inspired with the beauties and grandeur of the forest has said:

"Thank God for noble trees!
How stately, strong and grand,
Those bannered giants lift their crests
O'er all our beauteous land;
Palsied the arm that needless smites,
Withered the vandal hand.

Look on yon glorious shaft!
That gorgeous crown of leaves!
That pine has seen a hundred years
Gather its garnered sheaves;
Unshaken yet, his kingly spire
The crystal heaven cleaves.

Yon twain of gnarled oaks,
Keep watch above the graves,
Where bronzed and savage mourners came
To lay their stricken braves;
When o'er their ancient land first broke
The white man's bloody waves.

Lo! the grand gothic elms!
Like vast cathedral piles,
Look how thro' grained and graceful roof
The braided sunlight smiles!
While winds with noble organ tones,
Roll thro' their rocking aisles."

Essay on Planting Evergreens.

BY E. FERRAND.

The time for planting trees is getting near at hand, and, if I may judge from the many and large orders already received by our firm for Evergreens and Ornamental trees, I infer that the people are now convinced of the fact that, everywhere in Nebraska, the whole family of Pine trees, Spruces, Firs, Larches, &c., are perfectly at home. In order to encourage the planting of these valuable trees, and out of gratitude towards those who favor and support our undertaking in the propagation of those kinds of timber trees, I thought it was my duty to give at this meeting of the State Horticultural Society, all the instructions suggested by an experience of ten years in this country as an Evergreen tree raiser, and ten years in France as an Evergreen forest planter.

There is no more the least doubt as to the aptitude of this climate for coniferous trees. I have been traveling in this State all winter; on all the roads, and wherever I stop, I find planted a few Evergreens, doing well where cared for; others that would grow equally well, if the grass and weeds were kept away from the trees, until they were large enough to defend themselves against those enemies. My suggestions are as follows:

1st. Never plant your Evergreens in the fall of the year, but do it in the spring as early as you can obtain the trees.

2nd. Do not set your trees in the ground deeper, by an inch, than they stood in the nursery. Use no manure of any kind in planting Evergreens or Larch, but let the soil be mellow and friable, without lumps in contact with the roots.

3rd. Do not plant trees under two years old, even for stocking a nursery, and for the garden and the lawn give the preference to trees one to three feet high.

4th. Never dig deep among the roots of your trees, but keep the soil mellow and moist at the surface, by a light mulching of bruised straw or hay, that will prevent the weeds from growing.

5th. Last, but not least, get your trees direct from a nursery, carefully avoiding trees that peddlers heel in in the fall: because such are always killed at the roots, notwithstanding their green appearance, and—here allow me a little digression—give your preference to home nurseries. You have men here engaged in the business who have spent their lifetime judging what varieties of trees you would better plant for your profit and success. I will venture to say that aside from being for your immediate profit, it is your duty to get your trees of them, and good trees those will be, rather than to send your money to the East, that is constantly drawing from you. Your Nebraska nurseries will furnish you trees that have life in them, and you can save, besides freight, the 25 to 50 per cent. that the Eastern middle man, in the shape of a tree peddler, is extorting from you for commission on dead trees.

Unite now, as the Illinois farmers do, and get free from unproductive middle men, in ordering your trees from your own nurseries.

Essay on Timber Growing.

BY J. H. DAVIDSON.

The subject of agriculture is one that demands full as much attention at the hands of the reading public as it gets. Indeed no theme presents itself that is fraught with more real importance, so far as regards our prosperity, than the wants of the agricultural world. What we mean by attention is a studious and careful search for the best way of accomplishing certain desired results, not a superficial investigation of some theory merely for the purpose of creating differences or provoking discussions. The day has happily passed when being a farmer was synonomous with being a blockhead. It requires something more than the mere physical strength to keep up with the advance of the age in farming as well as in science. Many of the systems of fifty years ago are no more applicable to the demands of to-day, than would be an ox team to run an opposition freight line across the plains. The farmer who reads much, and reads that much with care, is the one who stands in advance in intelligence, influence and prosperity. This manifest interest and study in our lawful calling and agricultural pursuits, is what brings together annually such a great number of the fraternity to exhibit the improvements which are made from year to year. With these preliminary remarks I will proceed to the subject in hand, viz: "The Timber Question." The most important and all absorbing one to Nebraska farmers, as our young and prosperous State bears the reputation abroad of being the most destitute of timber of any other west of the Missouri river. After approximate estimate our State contains about one acre of timber to every two hundred of prairie, and the present waste and decrease is about five acres to every one acre planted and cultivated. I am convinced, from close observation, that two acres would supply the demand of every Nebraska farmer; as for the prospective demand one acre will be sufficient, provided the same interest continues among the people as has now been created, by our laws exempting so much from the assessed valuation and the premiums offered by the Horticultural Societies.

The best method of stocking our prairies with timber is to prepare the soil pecisely the same as you would if you were going to raise a large crop of corn. The quickest way to raise a grove is with cuttings of Cottonwood or Willow. I plow, drag and mark the same as for corn, four feet each way, which will contain 2,722 hills to the acre. I should plant one-half to trees, four feet one way and eight the other, making 1,361 trees and the other in corn for two years, to pay for cultivation, and that is all the cultivation needed. I should adopt the same plan in planting acorns, hickery-nuts, white and black walnuts, soft maple, elm and ash, where the sprouts are one year old. White Pine, Arbor Vita, Red Cedar, European and American Larch when large enough to transplant, require more cultivation. I estimate the cost of preparing an acre and getting the cuttings of Soft Maple or Ash, (they can be had by the thousand along our streams,) at $3 per acre. A man can plant 2½ acres per day. This is all the cost for ten years. Perhaps you will ask nothing for the use of the land? Yes, $3 per acre. According to my last year's taxes I had to pay three per cent. on the assessed value, and as the State exempts $100 on every acre planted to timber, you see there is your $3 per acre for the use of the land, a fair renting value. I have 1,361 trees per acre, seven years from planting I will cut one-fourth, or 340 trees, equal to fifteen cords of wood, the 8th year fifteen cords more, the 9th the same—the 10th year you see my profits. I should cut what is left, 456 trees. Allowing four trees to the cord, so as not to overestimate it—I have several trees only ten years old which are fourteen inches in diameter and 50 feet high, four I think would make a cord—I allow six trees to the cord, making 76 cords, and 45 cords cut before makes 121 cords. At $3 per cord, allowing $1 for cutting, I find I have $242. I contend that five acres planted to Cottonwoods, after a growth of seven years, will furnish one family with fuel for one stove a life time, and sell enough to pay for the use of land besides. The writer claims, after fifteen years experience in tree planting on this plan, which I adopted last spring on Arbor Day on my new farm in Otoe county, Nebraska, that the White Willow (Salix Alba) is equal to Soft Maple for wind breaks and fuel, and superior to all trees for rapidity of growth, as well as good for timber. Chestnut, too, is super excellent. The acclimatic influence af timber is discernable in the regular attraction of rain and tempering the chilly winds of winter.

Half a century ago a worn out field in Connecticut was planted in timber. The field yielded ten cords per acre, and fencing for the farm for twenty years, and last year, when cleared, produced forty cords per acre. The pine lands of Wisconsin and Michigan are estimated to produce one million feet of lumber to the quarter section. Allowing one saw mill to manufacture a million of feet per year, all can see how fast our northwestern pine lands are being denuded of their heavy growth, and the supply narrowing down fearfully. All of which is respectfully submitted.

Essay on Timber.

BY JAMES MORRIS.

As an introduction we shall make a rapid survey of the

PRESENT SUPPLY

Of timber in the United States. Not long ago our stately forests were the admiration of intelligent travelers, who enthusiastically compared their vast extent and their bewildering variety of trees and foliage, with those of other lands. While Europe produced but eighteen forest trees, growing higher than thirty feet, our hills and valleys exhibited not less than one hundred and forty. This was the land of forests. Now how changed the scene! The Eastern States to-day are hardly thought of in connection with the production of lumber, and Boston receives two millions of dollars worth of lumber from the south, in addition to a large quantity from Canada and Nova Scotia. What have we, then, upon which to depend for the supply of our numerous and increasing demands? Commencing with our own State we find only 429,885 acres out of fifty million, not one hundredth part, covered with timber, and a great portion of this Cottonwood or Willow. About one-half of Missouri is timbered land. Indiana and Ohio have considerable Pine, Oak, Maple, Ash, Walnut, Slur, Hemlock, Cherry, and Birch, but none to spare. Passing south we find Arkansas possessed of dense forests of Oak, Cottonwood, Pecan, and Black Walnut, while the Yellow Pine covers one-fourth of the area of the State, or about 13,000 square miles. This region is all but inaccessible and we presume will remain undeveloped, until the scarcity elsewhere compels its use at whatever cost. Florida is emphatically a timbered country. Its forests are magnificent. Yellow and Pitch Pine abound, while Live and Water Oak, Hickory, Elm, Ash, Walnut and some of the ornamental woods present a source of wealth but partially explored. The timbered lands are graded into four classes, and consists of about fifteen million acres. Alabama boasts of fine timber in the North and center, consisting of Oak, Hickory, Cedar, Walnut, Chestnut, Pecan, Maple, Elm and Mullberry, and Mississippi abounds with Yellow Pine, while the swamps are full of Black Cypress, Oak, Hickory, Black Walnut and Birch. Passing West and North into the partially settled States and Territories, we approach New Mexico with its mountain ranges covered with forests of Pine, Cedar and Spruce. Then comes Utah with two million acres of Pine, Fir and other evergreens, and in its valleys a fair proportion of Box Elder, Birch, Cottonwood and Dwarf Ash. Nevada has about four hundred acres of Cottonwood, Black Walnut, Dwarf Cedar and Nut Pine, and in the mountains Spruce and Fir. Idaho has magnificent forests upon her mountain slopes. As we reach California and the Pacific coast we find timber of the best kind in abundance. Forests of evergreens cover the mountains, while the ordinary kinds, already mentioned, fringe the margins of the streams. California is the land of gigantic trees. It exhibits sixteen species of Pine. The Yellow Pine reaches a height of two hundred feet and a diameter of seven or eight feet. Oak of the best kind partakes of the surrounding magnificence, while the White Cedar towers to a height of three hundred feet. The valleys of Oregon are unbroken forests of evergreens, where the Fir is seen reaching an elevation of two hundred and fifty feet. Washington territory now boasts of impenetrable forests covering an area of forty million and sixty thousand acres, notwithstanding the inroads which have been made upon this grand source of her future prosperity. Alaska is described as having grand forests of Pine, Spruce, Fir and Hemlock. Her evergreens extend almost to the shores of the Pacific on the West, and to within a short distance of the Arctic Ocean in the North. Turning back again we look, last of all, upon the pineries of Wisconsin, Michigan and Minnesota, the present source of supply for all the northern, eastern and some of the western States. Here the varieties are exceedingly numerous, embracing all of our best timber trees. The lumber produced is of a superior quality, and it is a subject of regret that wanton destruction on the part of settlers, and accidental fires, combine with the demands of the lumbermen to deprive this region of its chief attraction and value. In Minnesota there yet remain about three million six hundred and thirty thousand acres, and in Wisconsin only three million acres, and these are fast yielding to the ax and growing up to impenetrable thickets of brambles and vines, instead of renewing their former stately growth.

PRESENT RAPID WASTE

We are wasting with prodigal haste, one of the fairest portions of our inheritance. The rapid settlement of the country and the demands of civilized life have in many of the older States swept the forests away. While this fact indicates our indomitable energy, our progress and wealth, and hence may excite a feeling of exultation, it is connected with such consequences in regard to climate, crops and the future supply of lumber and fuel as to arouse the attention of all thoughtful and intelligent men. It is hardly possible to secure perfect accuracy upon this point, but a faint approximation to the truth is sufficiently alarming. The report of the Department of Agriculture says that from 1850 to 1860 fifty millions of acres of timber were destroyed, equal to the entire area of the State of Nebraska. In the next ten years the amount was doubled making one hundred million of acres absolutely stripped of trees. The statistics furnished by the lumber business are of a character to at once astonish and alarm. The figures given like those used to indicate the magnitude and distances of the stars, soon pass beyond our comprehension. We accept them as symbols of a fact whose proportions are infinite. In 1860 the total product of lumber in the United States was about six thousand six hundred and forty-five millions of feet; of lath three hundred and forty million; of shingles one thousand two hundred and sixty millions representing a total value of $104,928,342. Since that period there has been an enormous increase in the demand. In Chicago alone during 1868 there were received 999,229,866 feet of lumber and one hundred and forty-five millions of lath. The exports of the same year amounted to $12,500,000. The South contributed a portion of the supply. About twenty million feet of lumber are annually shipped from Pensacola to the Atlantic and Gulf cities, and the State of Florida realizes about $10,000,000 from this source. The Dismal Swamp Canal at Norfolk delivers every year three million feet of plank, fifty million shingles, four hundred thousand feet of timber, and eight million staves. But Wisconsin and Minnesota are the chief scenes at present of the rapid destruction of the primative forests. In the firstanamed State the business of cutting, manufacturing, and transporting lumber from the forests, has assumed immense proportions, giving employment to thousands, and yielding every year hundreds of millions of feet of lumber. As to the Falls of St. Anthony, Minn., one hundred million feet of new logs come down each spring, and numerous mills are busy, day and night, manufacturing. One of them will cut ninety-two thousand feet of lumber, fifty thousand lath, and twenty thousand shingles in twelve hours. There are cut probably two hundred thousand feet per day for the supply of the lower country. To these statements it may be interesting to add those which represent the consumption of lumber in our own State. They are furnished by one of our largest firms, and may be relied upon as correct. In 1872 Nebraska required about fifty million feet of pine lumber, with lath and shingles in proportion, and every succeeding year will increase the amount by at least one third, so that in 1875 we shall require one hundred million feet. The entire consumption of lumber in the United States last year amounted to seven thousand five hundred million feet. Of this Michigan and Wisconsin supplied three thousand millions; New York and the Eastern S ates one thousand million; Minnesota one thousand million; Southern States one thousand million, and the Western coast, where the trade is yet in its infancy, one thousand five hundred million. This includes lumber only; add to it railroad ties, lath; shingles, staves, ship building material, and fuel, and we begin to realize the possibility of our destroyimg ten millions of acres of timber every year. It is estimated that fifteen years will exhaust the supply of lumber, and that unless immediate steps are taken to avert it, we shall be in actual want of timber for fuel and mechanical purposes within fifty years. This leads to the

RESULTS OF DENUDING A COUNTRY OF TIMBER.

In addition to the scarcity suggested and the inconveniences involved, there are others of a far more serious character, which we shall give briefly and in their natural order of succession. First, the atmosphere becomes dry and ceases its healthy action upon animal and vegetable life. Science proves that not only do trees absorb carbon and yield oxygen, and thus contribute largely to the maintenance of animal life, but they conserve the moisture of the soil, and attract and detain rain clouds as they pass across the sky. Secondly, increased cold follows from the unrestrained sweep of wintry winds and storms. Thirdly, the departure of birds is no insignificant evil resulting from the destruction of their natural resorts. They not only charm by their plumage and song, but aid the farmer in destroying tribes of insects that prey upon the rewards of his industry. In their absence insects would multiply with such rapidity as to destroy the already diminished crops, which constitute one-fourth result. What might remain after running the gauntlet of drouth, cold and insect scourge, would render the avocation, usually regarded as the most certain, one of the most precarious. Combine with these evils the drying up of springs and creeks, and the lessening volume of larger streams, and all the industries dependant upon water power must cease. Imagination can easily picture as the end a return to desolation and barbarism. History, if we mistake not, furnishes examples in which this final catastrophe has actually been experienced. There are lands to-day regarded as barren, and occupied by a few nomadic tribes, which were once fruitful as the "garden of the Lord," and the recognized grainaries of the world. But their protecting forests were cut down without corresponding efforts to replant, and these lands exist only as a warning to those who are liable to perpetrate a similar folly.

THE EFFECT OF STOCKING AN OPEN COUNTRY WITH FORESTS

would be to reproduce the original condition of fertility and beauty. It is hard to imagine any atmospheric changes that could render the air of Nebraska more healthy. Whether an increase of moisture would be beneficial to human life or not, we are unprepared to say; but this much is certain, that the humidity of the atmosphere can be increased by the systematic planting of hedges and groves. This is no longer a matter of experiment, but a matter of fact. The Land office report of 1869 referring to Illinois, pp. 129, says "The extent of prairie surface has had an important influence upon the rain fall which is already affected in some localities by the planting of trees and by their spontaneous growth where they are protected from annual fires." Again on pp. 139, in regard to Kansas, we read, "The climate of the State has undergone remarkable changes; every year the rain increases, the aggregate fall from the first of January to the first of September, 1869, being six inches more than that for thirty-four past years. These changes were owing to the culture of the soil and planting of forest trees and orchards." Our own State may be cited as another illustration. Once considered as dry and sterile, its annual rain fall now is not only exceedingly regular, but greater than that of Illinois, and only a little less than Missouri and Ohio. To what extent this may be successfully carried must be determined by actual experiment, but that it will greatly modify climate, increase or create water power, encouraging various industries, and invest the entire surface with increased fertility and beauty is beyond dispute. So much are these facts appreciated that the Legislature of Maine has passed an act which exempts from taxation for twenty years all lands "planted or set apart for the growth and production of forest trees." In England during the last thirty-five years, forty thousand acres of timber have been planted, and liberal premiums are offered by landlords to encourage this practice. But the most remarkable instance in this connection is the contract made between Mr. Kelsey, of Pomona, Kansas, and the St. Joe, Topeka and Santa Fe R. R. This road through Kansas is 300 miles in length, and Mr. K. has engaged to plant with forest trees a quarter section every ten miles along the line, and cultivate the same. The company, on their part, give him eight years in which to complete the task, and then deed to him one section of land every ten miles, corresponding with his division and including the planted quarter. This gigantic experiment is expected to solve many questions connected with the culture and growth of different varieties of trees, and their influence on climate.

WHAT TO PLANT.

Before treating the general question we wish to offer a suggestion. It will be admitted that if in the work of planting trees we can, in addition to ornament, shelter and shade, secure two sources of profit instead of one it would be wisdom to do so. For this purpose we earnestly recommend, to all, the planting and culture of nut bearing trees. They are as easily raised as inferior kinds; most of them are rapid growers; they are all highly ornamental; they produce good timber, and they yield, after a few years, a regular and profitable crop. The present high price of edible nuts is an inducement of the highest kind. Present quotations are as follows: Filberts 12 to 15 cents per pound; Almonds 18 to 40 cents per pound; American Chestnuts $5 to $10 per bushel; Hickory nuts $1 to $2 per bushel; English Walnuts 10 to 20 cents per pound; Black Walnuts $0.75 to $1.50 per bushel; Pecan, (Mo.,) 9 to 10 cents per pound, Texas, 12 to 13 cents per pound. For a crop so regular, large and easily secured these figures are simply enormous. All of these varieties can be successfully grown in Nebraska.

In this enumeration we begin with the Filbert, which exceeds the Hazel nut in size and flavor, and, while not entitled to rank as a timber tree, grows to be a fine ornament or shade. The cost of yearling plants is inconsiderable, and they bear in four years.

Next comes the Almond, beautiful with its white blossoms in early spring, and making a fine ornamental tree. It is a sure bearer and the crop is always in good demand. Seed 18 to 40 cents per pound.

The Chestnut is probably the most popular of our nut bearers, and well deserves the admiration it receives on account of its stately growth, valuable timber, lovely foliage and delicious fruit. It is an object of beauty whether covered with blossoms or laden with burrs. It rapidly matures, and while somewhat sensitive to removal grows readily from the seed and adapts itself to soil and situation. A crop will be realized in seven or nine years. When mature trees are cut down, a valuable crop of poles spring from the stump, useful for rails, stakes and railroad ties. Prof. Agassiz says that no country in the world is better adapted to the growth of the Chestnut than Nebraska.

The English Walnut ranks next. It is of slower growth than many other trees but cannot be surpassed for the excellence of its fruit and the lightness and durability of its timber. Crop in seven or nine years. The tree is best raised from the seed, dropped in rows in the fall and protected from severe frosts.

The Pecan can be grown by us, and, while we know it at present only by its fruit, it is prized in the South for the excellence of its timber.

Then last, but not least, we would plant our own Walnut and Hickory. The fruit of the last is universally liked and brings a good price. Both trees, though comparatively slow to mature, produce most excellent timber for every purpose demanding toughness and durability, and the Hickory produces the best fuel. Both trees grow readily from the seed, and require but little, if any, care.

Having said so much in favor of a particular class of trees we return to the general question, "What shall we plant in Nebraska that will most quickly and fully meet our requirements." Shelter and shade are our immediate and imperative necessity." To provide these we unhesitatingly recommend first of all our native trees, in the following order: Soft Maple, Willow, Cottonwood, Buckeye, Ash. The Maple is raised from the seed as easily as corn; makes a good shelter when planted thickly in rows, and a grateful shade when room is given to its lateral branches. It furnishes a fuel which, though it does not consume so slowly as Oak and Hickory, makes a quick hot fire. We reserve statistics as to its rate of growth for a later page.

The Willow, objected to by many as a harbor for insects, yet offers a complete break to the keen winds, rapidly grows to a good size, and some varieties, as the White and the Weeping Willow, furnish good timber for fuel and manufacturing purposes. The common Osier, planted upon wet spots will pay as well as any other crop on the farm. Cuttings of all varieties are easily and cheaply secured.

The Cottonwood, while a very rapid grower and a beautiful object, with its dark green, ever moving foliage, is of little value for fuel, and can only be used for building material when effectually protected faom the weather. For fencing, siding and shingles it is almost worse than useless, warping or rotting immediately.

The Buckeye might be used to advantage wherever ornament is desired, its tropical foliage, and spikes of bright pink blossoms forming a most attractive addition to the lawn or grove. It grows very quickly, but the timber is inferior.

In this connection we would mention the Mammoth Aspen or White Poplar, a rapid grower found in Wisconsin, Minnesota and the adjoining parts of Illinois and Iowa. From cuttings it grows in five or six years, thirty or forty feet high, and four to six inches in diameter, with a clear limbless trunk for twenty or twenty-five feet. So straight rifted is it that with an ax it can be split from end to end. The timber resists the weather when deprived of the bark and lasts indefinitely. Fencing made with it, twelve years ago, remains perfectly sound. Five acres planted with cuttings will, in five years, furnish enough timber to keep up a fence around 160 acres, besides a good supply of fuel.

After shelter and shade, fuel becomes the next consideration of importance. While the trees already mentioned will answer to some extent the demand for fuel, others are superior on account of their slow combustion and their heat producing power. Among these we place the Oak, Hard Maple, Hickory, Walnut and Beach. All these are slow of growth, but compensate by their superior value.

For mechanical purposes we repeat the Oak and Hickory, and add to the list the Elm, Ash and Beach. The Elm is useful for almost any common purpose, and will last long when kept constantly dry, or on the contrary when kept constantly wet, and free from the air. It is exceedingly tough and light when dry. The Ash is at its prime when about 20 inches in diameter and the trees should then be cut, or they begin to rot at the heart. In planting set the young trees two feet apart each way. As soon as they appear to crowd each other, one-half may be cut as poles. The rest may then stand till they are 8 or 12 inches in diameter, and 40 or 50 feet high; they are then marketable, being in request for every mechanical purpose where flexibility and toughness are required. The Beech furnishes a clean, bright, handsome timber, light and durable when polished or kept under water. It is much used in the manufacture of domestic articles. For building purposes some already mentioned cannot be excelled. Oak, Walnut and Ash being largely used in the internal decorations of private and public edifices.

Pine, the great staple for building purposes, will succeed admirably upon prairie soil, especially the more sandy portions of it, but many years must elapse before we shall cut upon our hill sides, trees that will furnish sills for churches, or masts for ships.

As a source of profit the raising of trees in Nebraska ranks next to the raising of stock. A quarter planted with Chestnut, Spruce, Larch, Maple, Mammoth Aspen, or even inferior trees would in ten years yield a satisfactory return for the investment. To-day the U. P. requires a million and a half of ties, for which one dollar each would be given. It will always be requiring a large number annually, to replace the damaged or broken. In ten years many varieties of trees would furnish at least two ties each, the trees standing at the rate of about 500 per acre. Allowing $10 per acre as the cost of the land, the highest price for breaking, planting, cultivating, and compound interest on the first investment at 12 per cent. for ten years, the amount left as clear gain might satisfy the most exacting, about $140,000.

160 acres at $10 per acre,	$1,600 00		
Breaking at $3.50 per acre,	560 00		
Planting at $5 per acre,	800 00		
Seeds and yearling trees,	500 00		
Cultivating 3 years, $3 per acre,	1,440 00		
Compound interest on $4,900 for 10 years at 12 per cent.,	14,700 00	160,000 railroad ties at $1,	$160,000
Total cost,	$19,600 00		19,600
Profit,			$140,400

The cord wood will pay the cost of chopping, squaring and hauling. A gentleman in Panora, Guthrie County, Iowa, furnishes the data upon which he estimates that one acre of Cottonwood would be worth $728 in about fifteen years, and Mr. Raymond, of Council Bluffs, furnishes another estimate giving $902 as the value of an acre of the same kind of timber at the end of twelve years, reckoning 500 trees to the acre. Both calculations are endorsed by publication in the report of Agricultural Department, 1870. This is the encouragement for men of capital to convert the prairie into forest. In respect to our native trees there is no possibility of failure, only give them good soil and a fair share of cultivation.

Of Evergreens, in this connection, we can only say that where any can afford the time and money for the experiment, there is but little risk and they are unequaled as a shelter. A piece of wet land cannot be used to a better purpose than to plant it with Larch and Arbor Vitae, mixed with Soft Maple and Willow.

HOW TO PLANT AND CULTIVATE.

Assuming that the planting of trees will be done too often in a hurried manner and on unprepared ground, we give in the first place a few hints that may prove not unserviceable· In regard to our native trees, if the surface to be planted is hilly and covered with short grass they may be put in with the mattock. One or two blows of the implement raises a triangular piece of sod, under which the root of the plant is properly placed, the raised sod turned back and pressed down with the foot. Another plan is with a sharp spade to cut the sod in the shape of a cross, turn back the four corners from the centre, break up and make a hollow for the root, then set the plant in an upright position, return the sod to its place and firmly press it home. By these methods many acres can be planted rapidly and economically, and though many plants will fail, especially if a dry season follows, enough will remain and thrive amply to repay the time and trouble expended. Many valuable woods have been raised in England and Scotland by these simple modes of planting. Another expeditious plan is to run a furrow with the plow, place the young trees in it at regular distances, then with the plow turn back the soil, pass along the row, straightening the trees by hand, and press home the soil with the feet. Of course we recommend the best culture, but hesitate to lay down a series of rules, because almost every man has his own theory in relation to certain kinds of trees, and because many rules are unnecessary. There is one grand and obvious rule for planting which, while generally admitted is generally neglected, and demands to be stated and emphasized, namely, "Plant in good soil and cultivate well." It is true that some trees will fare better than others upon poor ground, and that they will live and make a certain kind of growth when left to themselves, but they well repay in rapidity of growth, and perfection of form, the highest culture. Treat trees as you treat corn for two or three years. The cost will be the same, about $3 per acre, and their future is assured. All the rules may be summed up in the one given; details in planting, such as distance apart, etc., will be regulated by the variety selected. In general plant thickly and thin out as the growth requires. In the case of native nut bearers, plant in the fall before the nuts dry out and their germinating qualities are impaired, and, if possible, in the situation the trees are permanently to occupy. Seed such as that of the Maple, Linden, Poplar, Elm, Ash, etc., should be gathered as it ripens, from May to fall, and planted in nursery rows. The Maple will make a growth of from two to three feet before winter. In localities destitute of these trees, the seed can be procured for $1.50 per pound.

The raising of Evergreens from seed requires more care, and a few failures may occur before achieving success. The simplest and best plan is to plant them in a box or frame where it can be under constant supervision. The seeds may sprout the first year, perhaps not until the second, but keep the box moist, the surface of the soil light and open, and in winter carefully protected from the frost. When two or three years old, remove the young plants from the box to their permanent situation. Now comes the danger as a general thing, but by kneading the earth firmly around the roots and providing a constant shade during summer, and a good shelter during winter for a year or two, Evergreens are not more liable to perish than other trees. A novel plan, combining both purposes, we saw originated or adopted by Rev. O. F. Conger, of Lincoln. Around each Evergreen tree was planted a circle of corn, about three feet in diameter. The corn affords shade to the young trees, which looked beautifully fresh and green, and in the winter will hold the snow and keep off the killing blasts.

Little need would there be to give rules "How and what to plant in Nebraska," if we would but stop the practice of annually burning our millions of acres of prairie. Nature herself would quickly give us forests. Nebraska is naturally a timber country, as proved by the rapid growth of planted trees, the spontaneous growth where fire is excluded, and the increase of timber perceptible in old settlements in spite of all demands made upon it for building, fencing and fuel. In Madison county systematic and presistent efforts have been made by some of the intelligent farmers to control the prairie fire and as the result young forests, consisting of Oak, Elm, Maple, Hackberry and Cottonwood, are springing up on the unbroken soil so thickly, that several trees three or four feet high can be reached by one sweep of the arm.

RATE OF GROWTH.

The rapidity of the growth of timber in Nebraska, and the West generally, is a matter of astonishment to those best acquainted with the fertility of the soil. Early this summer a fire occurred on 13th street, Omaha, which swept out four or five stores. Soon after a few Cottonwood trees in an adjoining block threw their white seeds upon the wind, and to-day the debris of that fire is thickly covered by young trees between three and four feet in height. Prof. Hayden in preparing his report to the Commissioners of the Land Office took the pains to measure for himself fruit and forest trees grown as experiments. The following are some of the results ; Cottonwoods ten years old, attained a height of 40 feet, and a circumference of 2 feet 6 inches; Soft Maple seven years old, a height of 15 feet, and a circumference of 2 feet 1 inch ; Common Locusts ten years old, a height of 25 feet, and a circumference of 2 feet 4½ inches ; Black Walnut ten years old, a height of 15 feet, and a circumference of 1 foot 1 inch ; Apple trees twelve years old, attained a circumference of 1 foot 6½ inches, and Silver Poplar seven years old, a circumference of 2 feet 4 inches.

IN CONCLUSION.

Plant trees on every vacant spot and at every leisure season during fall and spring. Plant for shade, for shelter, for beauty and for profit! Plant for the present, plant for the future! Plant for yourselves, plant for your children, and children's children! Plant the best trees, but if you cannot get them conveniently plant others—at any rate plant. By so doing in a few years our treeless prairies will be variegated with groves, making our State enchantingly beautiful and adding immensely to our wealth. The result will be attained at such a trifling cost as to be inappreciable when compared with the benefits secured.

Essay on Tree Culture.

BY C. S. HARRISON.

INTRODUCTION.

I find many difficulties in undertaking this work. The design, doubtless, was to obtain a practical treatise which every one could read and understand. Yet the beginner finds that a work as large as Bryants does not contain all the information he wants. I have condensed as much as possible. I have only used common names which every one understands.

It has been next to impossible to comply with some of the specifications, as "The present Supply," and "Rate of Waste." We have no reliable statistics. The Patent Office Reports are neither satisfactory or accurate.

I have visited Minnesota, Wisconsin and Michigan, to gather from the lumbermen all the facts possible. While in Michigan I became acquainted with B. Wait, of Bay City, a man of liberal education, who had spent a large part of his life in the Pineries of Canada and Pennsylvania, and who had at one time twenty-one mills. He had been spending several months in gathering just the items I was in search of, and to his kindness I am largely indebted. His figures have been accepted in New York, and by lumber dealers at large. I cannot give all the details of my investigations, but the results after the most careful deductions.

I cheerfully acknowledge my indebtedness to Bryant, Fuller, Downing, and the Wisconsin Report on the Destruction of Forests, and the various Patent Office and Horticultural Reports; but my main dependence has been on my own observation. I have visited many of the artificial forests of Illinois, and have enjoyed the acquaintance of the leading tree planters of that State, and instead of following any beaten track have endeavored to throw all the additional light I could upon a subject of such vast importance.

Accompanying this essay are some plans which, by way of suggestion, I trust will be of some value. I add some specimens of the growth of timber recommended.

A PROTEST.

In the specifications I find "All Essays offered to become the property of the Board." Tnis is not just. This essay has cost as much as the premium. If it merits the premium all well, if not it will not be just for the Board to claim it without a recompense.

MISSION OF FORESTS.

In all the economy of nature there is nothing more wonderful than the design of the Creator in covering a large portion of the earth with forests. Let us look at some of the ends secured by them.

A GREATER AND MORE EVEN RAINFALL.

This has been ascertained by long and careful investigation in France, and in our Western States it seems to be an established fact that the rains, to a great extent, follow the grove belts and water courses. Why this is so we cannot tell. One theory makes every tree a lightening rod, wooing the clouds ; another is that rain is produced by the moisture laden air coming in contact with a greater degree of cold than it possesses itself. Thus cold mountains piercing the clouds extract the rain. Now, the air in the forests is cooler than the air of the plains, hence a greater liability to rain in their vicinity.

FORESTS PREVENT FLOODS.

All the vallies of our large rivers, of late years, are subject to fearful inundations. The destruction of property from this source alone in a single year has been estimated as high as $100,000,000, and every year shows a greater tendency to these disasters.

A gentleman living on a beautiful island in the Hudson, near Ft.

Edward, informs me that since the timber has been cut away from the head of that river there is nothing to retard the melting of the snow in the spring, or to catch the rains as they fall, and every year as the waste goes on the floods rush down with greater and greater impetuosity.

The Creator designed our great rivers for navigation, and if they can be kept for this purpose they will be a source of immense wealth to the nation. In order to secure their permanent value for this object, he planted the heads of all our rivers with immense and beautiful forests. Now a body of timber is especially adapted for the retention of the rain fall. Suppose twelve inches of water falls in an open country and the same amount in a forest in twenty-four hours. In the former instance, though the ground may be dry, it is impossible for it to take in this amount, probably not more than four to six inches. Now multiply the area of the watered region by six inches, and you have a flood of fearful magnitude—especially if the country is rolling.

Let the same amount fall in a forest. You watch it as it comes. Ten thousand leaves on every tree catch and hold the drops, and when they strike the ground there are six inches of leaf mould, and the ground itself, for a foot in depth, is very porous, the leaves hold it till the ground drinks it in; the old rotten logs are all like sponges, and if the ground and mulch cannot retain it all the roots seem to build dams to obstruct it, and though so much rain has fallen the streams are hardly swollen, and now one sees the design of this surface cistern. The water begins to ooze out by slow degrees, and when the streams of the open country have run themselves dry, and the ground is baked for the want of more rain, the wood fed streams are in their full flow. The navigation of our finest rivers is already affected by the thoughtless destruction of the forests. When will men learn that God made trees for more than the lumber in them?

The head waters of our grand Missouri are losing their forests as fast as the short sighted lumber dealers can remove them. The lumbermen now leave nothing behind them, "For," say they, "the fires follow as fast as we can go"—leaving in their wake a blackened waste.

Of course there is nothing to retard the melting of the snows. The rains are wearing the channels deeper and deeper, and rush with swift impetuosity to swell the floods, and then low water and exposed sand bars are the result.

FORESTS GIVE A GREATER DEGREE OF HUMIDITY TO THE AIR.

In this respect the mission of bodies of water and forests are identical, though their operations are different. Our lakes give out moisture by evaporation, and our forests by the respiration of their foliage. The thrifty Cottonwood in your corn field gathers up water by the pailfull and pours it upon the air, and so dries the ground that you cannot raise corn within two rods of it. In like manner the forest is at work loading the air with moisture silently pumped up from the surface cistern, and the result is apparent in heavier dews and the greater vigor of plant life.

FORESTS PROTECT THE SOIL.

Even a steep hill side covered with trees retains its form and soil, but cut these away and deep gullies form; the earth is washed off, and the land ruined. The removal of the trees and the breaking of the prairie involves this washing of the earth to such an extent that the Missouri river is being affected by it, and the engineers, in a recent government report, mention it as requiring immediate attention.

Trees should be planted on hill sides and places inaccessible to the plow. The worthless Highlands of Scotland were made very valuable by being covered with trees. One, in going up the Missouri river, is impressed with the fact that land, rocky and broken, is made beautiful and picturesque by its covering of trees. A forest climbing the hill sides and covering their barrenness, transforms barrenness into beauty.

Trees should be planted where they will intercept the wash of the soil. The waste by this washing is enormous, and if this can be remedied by planting at the foot of ravines, and upon low ground, great good would result.

FORESTS PROTECT FRUIT AND CROPS.

During a recent visit to Western New York, formerly one of the finest wooded regions of the world, I was struck with its barrenness. The wheat crop is diminished one-half, the removing of the forests has made the conntry as windy as Illinois, and the small patches of trees left standing are blown down by the winds, which sweep with unchecked impetuosity. I counted thirty massive trees, in a few acres, which had been uprooted by the storms. This section was once famed for its winter wheat, but, as there is nothing now to protect the fields, it cannot be depended upon. Fruit also suffers.

One writer in the State of Michigan says: "It has been found that the winters have greatly increased in severity within the last forty years, and this increased severity moves on even paced with the destruction of the forests." Thirty years ago the Peach was one of the most abundant fruits of that State, now it is an uncertain crop, and frosts often injure corn.

Years ago Peaches were plentifully raised in some of the New England States, where it is impossible to grow them now. Another Michigan writer estimates that for lack of its natural protection, the trees, the State has lost as much as five million bushels of wheat in a single year.

FORESTS PREVENT DROUTHS.

One prolific source of drouth is hot, drying winds, which, with unobstructed progress, sweep over the earth, drinking up the moisture. My place in East Illinois was timber land, hard clay, which, if fully exposed to the prairie winds, could not be worked in time of drouth, but, surrounded by trees, few pieces of land could so well resist the dry weather, and in the memorable year of 1870 I had the finest products in LaSalle county. If our farms can be belted with timber three-fourths of them would be worth more than all of them when exposed as now.

AS GUARDS AGAINST INSECTS.

Forests would doubtless serve as checks for those myriads of destructive insects which are now the terror of the farmer. Grasshoppers, which so often visit our Northern and Western frontiers, have their origin on the great plains and prairies. Chintz bugs cannot thrive well in dense forests, even heavy grain is not favorable to their increase, and it is hoped that they may, in a measure, be fenced out when we shall have bodies of timber to obstruct their course.

MATERIAL FOR THE ARTS.

Again, we must have material for the arts. Our wants are continually increasing and there are a thousand new demands our fathers never knew. Machinery, costly and complicated, must have timber for its construction; into all the avenues of comfort and civilization timber comes as one of our chief dependencies.

FUEL.

Wood is the most natural fuel. Coal may fail but wood never ought to, besides our coal beds are very unevenly distributed. It seems wicked to use corn for fuel. In the Wisconsin report estimates were made of the expense of raising corn and hickory for fuel, with a decided advantage in favor of the latter.

Trees are nature's grand conservators. They equalize the temperature; they are checks to violent winds; they defend the crops and the people, and are the bulwarks God ordains for the protection of his children.

Springs and streams which never were known to fail, have dried up when their protections were cut away.

THE CURSE OF GOD

Falls heavily on the people who ignore His grand designs and rob the lands of forests. Egypt was once one of the most fertile and wealthy of countries. Remains of petrified forests yet attest what her defences were against the drifting sands. These were destroyed and Egypt became a desert. Palestine was a land flowing with milk and honey, a land of charming landscapes and giant forests, but these are gone; the rugged hills once covered with trees are washed to the very core and the Holy Land is a desolation.

Spain is nothing to what she might have been if she had preserved her forest bulwarks. France has suffered much in the past, but the Frenchman is quick to see his errors and avoid them, and now forestry recieves a generous protection from the government, and so with Germany.

This world was made for man's comfort, and it is placed in his keeping, if he abuses it retribution is swift to follow. Look at this fearful picture of the famine in Persia, the result of prolonged drouth, and this the result of removing those stately forests, which were a crown of glory. This is copied from Zion's Herald:

"The details of such a terrible visitation are beyond human sketching. Food becomes scarce and costly. The poor have no longer money with which to procure it. Brass and iron pots are sold, earthen ones alone being retained; doors and window frames are removed and sold for food, which is doled out in mouthfuls to the household. The play of children ceases at the hearth, the noise of joy is hushed in the village. Everything is sold for grain; the bark of trees, pieces of old leather, fruits, roots, are all consumed. Now fathers barter their children, and wives abandon their husbands for bread; the village is deserted, and the roads lined with men and children flying for relief. Wasted to shadows, worn out with anxiety, they totter along, or fall on the highway. Skeleton dogs gnaw the skin from skeleton men ere they are dead, in full sight of crowds too stolid, too indifferent, too weak, or too near dead themselves to do aught to interfere with the carnival. Pestilence follows in the train, and the stench from acres on acres of unburied bodies, attracts the vulture and the jackal. All animated life soon shares the calamity; the cattle are dead or dying; the very fish perish in the beds of the shrunken rivers, and the official report of the famine in Marwaa, made to the British Government, now lying before me, says, not only the deer and the jackal, but the very field rats died of starvation. Agriculture, the arts, trade, manufactures—all avocations are abandoned. Labor is paralyzed. Seed for future crops is unprocurable, and the few survivors are without ambition, as they are without solace. In their generation they will never be anything but poverty-smitten toilers, and the inheritance of their children must be only one remove from their own desolation.

"It is frightful to hear the yet more graphic picture which our missionaries sometimes depict of isolated instances of poor wretches sitting on their skeleton haunches, craunching blue marl, which, with both hands, they are barely able to hold in their wasted jaws; of carts crowded with skeleton children crawling over their fellows dead in the same vehicle; of the brute force which was necessary, in making a tolerably equal distribution of a few grains of food to infuriated masses of men, women and children, and of much beside from which the very steel of one's pen shrinks. Oh, it is terrific!"

We read accounts like this with a shudder, for it seems like the far away premonitions of our own doom. That doom will come with sure and merciless approach unless there are prompt measures taken to avert it.

EFFECT OF PLANTING AN OPEN COUNTRY.

The probabilities are that the same benefits would be obtained that are enjoyed by the timbered regions. We know how it has been in many instances. Rains fall on the young trees lately planted in Egypt, where it was never known to fall before. Portions of Utah, considered rainless, have been watered by showers since trees have been planted. There is some foundation for the belief that rain follows the white man. Providence seems to encourage the adventure of men as they push Westward. The mythical desert will doubtless be covered with beautiful groves and fruitful orchards even to the base of the Rocky Mountains. In many places where streams and springs have been dried up by the removal of the trees, they have been recalled by the planting of their protectors. There is a remarkable prophecy in Isaiah which so accords with nature and history, that I must mention it, "I will open rivers in high places, and fountains in the midst of the vallies; I will make the wilderness a pool of water and dry land springs of water." Then, as if to mention the cause which is to produce these results, he adds, "I will plant in the wilderness the Cedar, the Shittah (Acacia) tree, and the Mystle, and the oil tree; I will set in the desert the Fir tree, and the Pine and the Box tree together."

THE PRESENT SUPPLY AND RATE OF WASTE

Are hard questions to settle. In conversing with the lumber dealers of Minnesota, Wisconsin and Michigan, I find a great variety of opinions.

Mr. Geo. Pinney, writing from Sturgeon Bay, Wisconsin, for the Patent Office Report, says: "There are 10,000,000 acres of land in

Wisconsin and the upper peninsula of Michigan, north of the 44th degree of north latitude, which were covered with forests before the settlement of the country; now only four millions of acres remains." He adds:

"The average yield of pine timber in this region is usually estimated, by practical lumbermen, at 300,000 feet for 40 acres. Some place it higher. Reckoning 333,000 feet, it would require a little more than 200,000 acres for the annual timber supply. If we add to this sum one hundred thousand acres for railroad ties, telegraph posts, hewn timber, shingles, and fire-wood, determined by actual amount received in Chicago market, and thirty thousand acres for the amount cut and burned on the ground in clearing the land, we have three hundred and thirty thousand acres denuded annually. At this rate of consumption, all the valuable timber now remaining on this extensive tract will be consumed in the short space of twelve years, and the probability is that the portion lying east of Fox River and Green Bay will be gone in half that time. The hard wood timber, principally cut for fire-wood, will doubtless continue longer, perhaps, ten or twelve years. It is true, the lumbermen do not remove all the growth in cutting off the timber, but fires generally follow in their track, and consume what remains.

It is gratifying to note that the Northwest, where so rapid denudation is going on, is also foremost in remedial experiment. In Iowa, Illinois, and Missouri, timber is principally grown from the seeds of trees found in the native forests, and it is supposed that about one hundred million of such trees are planted annually in the prairie States. The firm of Pinney & Lawrence, of Sturgeon Bay, Wisconsin, sent to the prairie States nine million trees in 1869-'70, and their shipments during the spring of 1871 was between ten and fifteen million. Robert Douglas, of Waukegan, Illinois, shipped as many more, and several other nurserymen sent out 100,000 to 100,000,000 each. Reckoning the number of trees shipped by the nurserymen at 50,000,000, the planting in the prairie States will amount to about 150,000 trees. The average number of trees required for an acre, as usually planted, is about 1,000. At this rate 150,000,000 trees would plant only one hundred and fifty thousand acres annually throughout all the West, which would not compensate for half the denudation in the district east of the Mississippi River, and to the north and west of Lake Michigan, as may be seen by the foregoing figures."

Mr. Wait, of Bay City, Michigan, after long and patient investigation, makes the following estimates:

"The production of white pine in the United States will not vary much from the following figures: Michigan, average of the year 1868, 1869 and 1870, 1,800 million feet; Wisconsin and Minnesota, 1,250 millions; Pennsylvania, logs and log timber, 650 million; New York and New England, 200 million; making a total of 3,900 million feet; add for long timber, not included in above, and cuttings of small local mills, 250 millions and we have a total of 4,150,000,000. The value of this lumber crop, at the mills at a low average of $15 per M., with the value of shingles, laths and pickets manufactured, together with the long timber and it will reach 75 millions as the mininum valuation at the points of production, with transportation, yard expenses and profit added, and it will amount to one hundred and fifty millions to the consumer."

He estimates that there are forty billion of pine in Michigan, six billion were destroyed by fire, leaving thirty-four billion; in Minnesota and Wisconsin there are about thirty-five billion more, making a total of sixty-nine billion, divide this by the annual waste 4,150,000,000 and we witness the total destruction of pine in about seventeen years. This is the limit, then, of the pine period, provided the same waste continues.

This rate of waste will probably not be increased, but will rather be diminished. After next year, when the burnt pine shall have been saved, prices will be much higher, and will continue to have an upward tendency. Now, it will not pay the farmer to purchase fencing at $50 per M.; hedges will be substituted. Then cattle feeders find that belts and groves of Evergreens make so good a shelter as to be a substitute for barns—another saving. Other materials will be used. The growth of pine is also to be taken into consideration, so, from all these data, we conclude that our pine will last from twenty to twenty-five years longer. But in the mean time millions will be added to our population, and the want, in spite of every substitute, will increase in fearful ratio, and these facts will confront us: Our country will be but half settled; our houses but half built, and the old ones in need of repair, and the great want growing all the while more and more ravenous. Then our railroads are eating their way through our densest forests. There is hardly timber enough to supply the needs of those already built, and we must have new lines every year. Our wants must grow with the increase of our population. The scarcity of timber will soon afflict all our industries. We complain of high freights, but Illinois, Iowa and Nebraska require about thirty millions of railroad ties every six years. Where are these to be obtained, and what will be the probable cost? Every railroad needs a strip half a mile wide along its entire length to keep it supplied with fuel and timber.

There are also sixty-six occupations, employing 475,623 persons, who are dependent on timber for the raw material on which they work. There are other callings also dependent, to a large extent, on the same material. And the luxuries and inventions of the age, with the stupendous growth of our country, will awaken wants perhaps unknown at present. But this great need is not all there is of it. Climatic changes which give us flood and drouth with such fearful damage, will be more and more marked till we become like ruined Persia or like France we will see the danger and avert the evil.

AS TO THE FUTURE PROSPECTIVE DEMAND AND SUPPLY.

We have approached the case somewhat by a review of the probabilities of the case. The French and Germans have carefully gone over the same ground, and have decided that at least a fourth or fifth of the whole country should be planted to timber. By referring to Pinney's figures we find that it takes 330,000 acres to supply us with pine alone. Our wants will soon demand 500,000, and ere long one million, but how many young trees twenty years old will be equivalent to an acre of pine as it now stands, with a growth of one hundred and fifty years? Whichever method of reckoning we take we are met with the stupendous problem. Pinney mistakes the acreage planted. He goes on the supposition that all the trees sent out by himself and the nurserymen live, but probably not a fourth of them do. I have seen this year thousands of Mr. Pinney's own trees, not a tenth of which lived. Hardly anything has yet been done in the stupendous work. In visiting the pineries one is struck at the utter desolation which the lumberman leaves behind him. In Minnesota and Michigan everything is cut away, and the fires follow close after the workmen, and the destruction is complete. I found an exception in some portions of Wisconsin. Some of the land owners are leaving the younger trees which will in twenty years return a generous harvest. The pine land owners are very short-sighted and even criminal. I told them we were planting pines on the prairies and would make money out of it, and here you are allowing the fires to run upon your lands, which, if defended, would in a few years be of fabulous worth. There is usually enough young pine on the land if it could be protected. But they congratulated themselves with the fact that pine land worth three years ago only $10 per acre, is now worth $50, and they can afford to cut closer than ever.

BEST METHOD OF STOCKING OUR PRAIRIES.

There never was a State where greater enthusiasm prevails on this subject than in our own, but most of our farmers are poor and it is a serious question how to begin. Cottonwood, Lombardy Poplar, and White Willow will soon be within the reach of all. The timber on our streams also affords abundant seeds so that with but little expense a commencement can be made. A short row of those varieties propagated from cuttings, will, in a short time, afford scions for acres.

The White and Scotch Pine, the Norway Spruce and Larch can be planted six feet each way, and then the ground can be filled with deciduous trees, so that the rows will be three feet apart each way—the deciduous trees to be cut out as soon as the others need the room. Such close planting will induce a straight growth, and the thicker the trees the sooner they will take possession of the ground. Or these expensive trees can be planted eight or twelve feet apart, filling the remaining ground so that the rows will be three or four feet each way. It is desirable in planting other trees with Evergreens to choose those with upright branches, those with strong latterals would whip and bruise the Evergreens. Another plan is to plant native trees around a piece which is to be planted to coniferæ, when the wind break is large enough for protection. The coniferæ to be alternated with deciduous trees to be removed when they crowd the former. If trees are planted six feet each way it will require 1,200 per acre; eight feet, 680; 12 feet, 325. Twelve feet is as near as White Pines, for instance, ought to stand when twenty years old. The cost of coniferæ when wanted for screen planting, will be from $3 to $6 per thousand. Such should be planted six feet each way, then, if they do ordinarily well, they will make two railroad ties each in twenty-five years.

The young trees will need to remain under shelter for a year or two, when they should be transplanted into nursery rows to remain two years under the most careful cultivation, when they will be ready for field planting.

Larch must never be planted after the leaves have started, and they will do better to be first toughened to this climate by screen and nursery cultivation before they are set out in the field.

The great trouble in tree planting is that people will run rashly into it, pay a high price for their trees, get more than they can care for; then, of course, lose them, and become discouraged. Unless a man is used to the business he must begin slowly, taking a few to try at first.

A few years ago it was thought that the cone-bearing trees would not grow on the black prairie soils, but experience has proved that they can no where be raised with greater success. The beautiful evergreen forests planted in Iowa and Illinois, and the few trees planted in Nebraska, afford the greatest encouragement. The success of Bryant, Schofield and Edwards is well known. J. W. Pearman, in a paper read before the State Horticultural Society, says:

"Well do I remember visiting the beautiful orchard and nurseries of our worthy President, Mr. J. H. Masters, near Nebraska City, some twelve years ago, and saw him there planting a few Pine and Spruce trees, about three feet high, and little did I then suppose that in the short space of time that has elapsed, these same little pine trees would grow to the height of thirty or forty feet. Such is the case, and any one can now see them growing where they were first planted—a living evidence that Nebraska is really a timber growing State, as well as the best grain and fruit producing district in the Western country. The experiment in timber-growing in Otoe county, is a success in every respect, as Messrs. Masters, Donahue and Morton, members of this Society, will bear witness. In 1854, when we first settled in Otoe county, the supposition of two thirds of the inhabitants was, that in less than ten years, our timber along the Missouri bluffs and river bottoms, would be exhausted, and we dependent upon other localities for the necessary supply; and well they might have thought so, for every one that had a timber claim upon the public lands, seemed to try how fast they could cut and destroy it. Seventeen years have passed away since that time, and notwithstanding the increased demand for all kinds of timber, and the amount actually used, I think I am safe in saying that Otoe has to-day, at least ten times as much timber as she had in 1854, and what is here said of Otoe county, in the growing of timber, may safely be applied to two-thirds of the whole State."

The success of tree planting in the West has been all that the most sanguine could desire. I give a measurement of the trees on Mr. Bryant's plantation:

"First, we measured a Catalpa tree, whose rich foliage, and beautiful and showy blossoms give it a crown of glory among the neighboring trees. This is twenty-eight years from the seed, and, measured eighteen inches above ground, it has a circumference of seven feet. Next, we measured a Norway Spruce, which is more than forty feet high, very bright in foliage, raising its graceful trunk through a pyramid of branches. The lower limbs of this tree do not drop off, but push themselves out near the ground, till they fill a circle, whose diameter is about twenty-five feet. This habit of the tree, with its extreme hardiness, makes it eminently desirable for screens. But you say "They grow so slowly." Do they? We measured this tree, as we do all the rest, eighteen inches above the ground, and find its circumference to be five feet. I asked the age, and found it to be only twenty years old. A stately White Pine near it, nineteen years old, gives the same measurement. A Tulip tree, whose fragrant blossoms in spring, add so much beauty to this young forest, is twenty-five years old, forty feet high, and has a circumference of four feet. A beautiful Chestnut tree twenty years old, is of the same size. A noble Honey Locust is twenty-five years old, and measures six and a half feet. A Soft Maple, thirty years old, is of the aame size. As I walked away from this charming spot, I thought of the possibilities of beautiful Nebraska, if people have only a mind to plant."

PROFITS OF TREE PLANTING.

The following is from the Patent Office Report of 1870:

"Mr. D. C. Schofield, of Elgin, Illinois, says that Pine and Larch, as demonstrated in his own grounds, attain the height of thirty to thirty-five feet, with a diameter of eight to twelve inches at the collar, in twelve years. He would plant three feet apart, every fourth tree each way a Pine, the remainder Larches, a proportion of one to sixteen, giving the pines twelve feet each way. One square yard to each would admit of 4,840 trees on one acre; but Mr. S. abates a few for possible losses, and supposes 4,800 trees, of which 300 are Pines, and proposes to cut out 2,400 Larches at the end of seven years; 1,200 more at the end of fourteen years; 600 at the end of twenty-one years, and the remaining 300 Larches at the end of thirty years, leaving three hundred Pines twelve feet apart each way. He figures the yield as follows:

2,400 trees as grape stakes, at 5 cents,	$ 120
1,200 trees as fence posts, (4,000, at 25 cents,)	1,000
600 trees, at $3,	1,800
300 trees, at $20,	6,000
4,500 trees, aggregating in thirty years,	8,920

He values the remaining Pines at $6,000, to be worth $9,000 in ten years more, and $15,000 in twenty years, making in all, at the end of fifty years, $23,920. This is, of course, hypothesis, and perhaps, extravagance, which the reader may abate in accordance with his own judgment."

In estimating the value of timber we are not to base our calculations on present data. In a few years pine lumber will be from $50 to $100 per thousand, and I have seen White Pines, grown on the prairie, 21 years old, which would make the frame of an ordinary dwelling. I have seen Larch at the age of fourteen years which would do the same thing. Pine trees, well started in good land, will make an enormous amount of lumber in 30 to 40 years, and the White Willow, Lombardy Poplar and Cottonwood will yield generous returns in 20 and 25 years. The great timber famine will soonest be felt at the greatest distance from the Pine lands. An acre of timber in Nebraska will be worth three acres in Wisconsin or Michigan, because the gleanings of the great forests will keep them supplied for some time to come, and the man who plants now and plants largely cannot fail of success, and the trimmings from his forests will soon pay him for his trouble.

ROAD TREES.

People seldom take into account the value of their road lands. A quarter section is supposed to have a road on two sides, making one mile. The man who holds the quarter owns the land in the road, he only surrenders the right of way. He would be a public benefactor if he would plant one mile of trees ten feet from his hedge. Every road would then be a beautiful avenue, comfortable to the traveler in summer and winter. Planted eight feet apart, the owner of the land would have 640 trees, worth in thirty years, perhaps, $5 per tree, which would amount to $3,200, an amount which it would well pay to look out for.

PLANTING IN BLOCKS.

On account of fires it is well to plant trees in blocks of five to ten acres when a large amount is to be planted, and the ground one rod wide around these blocks should be frequently plowed. The growth on the whole would probably be as great as if it was all closely planted, while in this way the danger of fire would be obviated.

INTRENCHMENTS.

On level ground it will be well to throw up a ditch around the blocks, putting the ditch on the outside. The object of the embankment being to retain all the rain which falls, compelling it to soak into the ground thereby laying up a store for time of drouth.

CULTIVATION.

There can be no success in timber culture without the best of cultivation, and the best of care in setting out the trees. Some men cannot plant anything and have it live. They seem to poison everything they touch. If a man has no ability in this direction he ought to employ some one who has.

Never plant a tree in prairie sod and then complain because it will not grow. Everything depends on the start. Years ago my father planted a locust grove. It was all hoed once, and half the second time. Twelve years, after those hoed twice were twice as large as those hoed once while the trees were only a year old.

MULCHING.

The destruction of evergreens the past winter shows the need of the greatest care. Our black prairie soil will resist the drouth much better even than where evergreens grow naturally. In visiting the Eastern nurseries this season I found that they had suffered far more there than we had in the West. But, yet, we cannot be too careful. Trees planted where they cannot be thoroughly cultivated must be mulched heavily. Trees planted singly in the lawn, or elsewhere, should also be well mulched. I have noticed that Evergreens endure the drouth much better in groves than when planted singly.

WIND BREAKS.

It is doubtful if we can succeed in fruit raising to any extent without protection. Among the deciduous trees any rapid grower will answer, and among the Evergreens the White Pine, Scotch Pine and Norway Spruce are excellent. The last probably the best. I have seen hedges six years old, of this variety, which were ten feet high, and so closely woven together that the snow could not get through them. Four feet apart is near enough. On account of its strong side branches a single row of this tree, thus planted, will soon keep out the stock, and be a great defense. Where two rows are planted they can be six feet apart, care being taken to break joints. * * But Evergreen wind breaks need to be defended in this climate with Cottonwood or some other screen, and must be well mulched or cultivated till thoroughly established.

PROPAGATION OF TREES.

CONIFERÆ.

The ground must be spaded two feet deep, leaving the soil on top; level the ground and put on the seed at the rate of one pound to four feet square for Larch and twice as much space for other seeds. Mix soil and sand about half and half and spread it on evenly over the seed, one-fourth of an inch deep. You must now watch the beds closely; mice and birds are fond of the seeds and tender plants. I have had whole beds devoured in a single day. The beds are screened by lath put together in pannels four feet square, the spaces between the lath about an inch. Place the pannels on stakes a foot high. Watch closely the effects of the sun and damp river.

The great danger is from the mildew. When this affects them put on dry sand. I have succeeded best by having beds in exposed places, where they can be readily aired. I nearly lost one bed which was where the wind could not strike it.

Have the beds near the house so you can watch them daily, and water when necessary. The propagation of Evergreens will be a remunerative field for female labor. Women will probably make the best plant nurses. In winter the young plants must be mulched with leaves or straw.

When plants are a year old, the largest are usually taken out and transplanted in nursery rows, eighteen inches apart; in two years they are again planted four feet apart, so they can be cultivated with a horse; in two years more they will probably be ready for the forest plantation.

The great trouble is in procuring seeds that will grow. I have never yet got good seed by sending to any of the wholesale general seed stores. Wm. Hill, of Dundee, and Robt. Douglass, of Waukegan, Illinois, are responsible dealers, and if good seed can be got they will get it, they are large planters, and sell to others such seed as they use themselves.

NUT BEARING TREES.

The nuts should be gathered as soon as ripe, and dried slightly in the shade; care should be used to prevent their moulding. Some plant in the fall where they are to remain, but they sometimes become water soaked and killed. The better way is to mix slightly with earth or sand and place in mounds with a slight covering—securing at the same time perfect drainage. Let them be thus till they thaw in the spring, then plant early. Chestnuts and acorns do not need fusing, mixed with sand they can be kept in a cool place. It might do well enough to plant acorns in the fall, as they sometimes sprout then. They need no drying whatever.

Lighter seeds, as the Ash, Hard Maple, Ash Leaved Maple, Basswood, should be kept without drying, and without moulding. It is well to mix with sand. Fusing is not necessary. They should be sowed early in the spring, and may be sowed in the fall.

PROPAGATION FROM CUTTINGS.

Failure here generally results from too great exposure of the scions. If too much is left out of ground, as evaporation is going out from every point of the surface, and there are no roots to sustain it, the tax is very severe, and when to this a few twigs and leaves are added the burden becomes insupportable. This is true of cuttings as ordinarily used. In the case of fencing with large Willows, as mentioned elsewhere, on account of the large size of the cuttings, they are stored with a sufficient amount of what is termed plant food to endure the strain. Scions should be about sixteen inches long and only an inch or two left out. Probably the better way is to take long switches and bury both ends leaving a slight exposure in the center. This prevents evaporation from the tips.

BEST KINDS OF TIMBER FOR THE PRAIRIE.

CONIFERÆ—WHITE PINE.

It is difficult to estimate how much we are indebted to this tree. 4,150,000,000 of White Pine were cut last winter, and this enormous amount, reckoned at $15 per M., gives us some idea of its importance. This tree is too well known and too many are indebted to it for their homes, for me to describe it.

Young trees of this variety are gathered in our pine forests of Michigan and Wisconsin, and are sent out at a cost of from $3 to $6 per M. They are carefully transplanted under close screens, when in a year or two they become acclimated; then they are transplanted in nursery rows to grow a couple of years longer, when they will do for forest planting. About 325 will suffice for an acre.

YELLOW PINE.

Why this tree is not more generally cultivated we cannot say. In Virginia when the ground lies idle it soon becomes covered with it. It grows with amazing rapidity. Trees 10 inches through have been found where the corn stalks were yet standing. This kind does not need the screening which other trees demand.

SCOTCH PINE.

A very rapid grower. I have a section of a tree raised on the grounds of Wm. Hill, of Dundee, Illinois. It had been out thirteen years and had a diameter of thirteen inches and was thirty-five feet high.

THE AUSTRIAN PINE

Is much like the above, though more dense and shorter jointed. Not quite so rapid a grower.

NORWAY SPRUCE.

This tree is indispensible; a very healthy and rapid grower. It adapts itself to almost any soil and climate, and produces the Bergundy pitch of commerce. Planted in forests it is very valuable for timber or boards. It is extremely beautiful as an ornamental tree. It is inclined to "sport," and in a thousand you will find marked variations; some of a beautiful weeping habit. The plantation of Mr. Edwards, of LaMoil, Illinois, is a pleasing illustration of this tendency.

AMERICAN LARCH.

One of the most striking views presented in our Northern forests is a Tamarack swamp. The trees are very close and very tall, sometimes one hundred feet high, consequently the burden of timber on an acre is enormous. I have been surprised while living in Minnesota to see how little ground it took to furnish the pioneer with logs for his house and barn, and rails for his fields. Its straightness and strength make it very suitable for fencing. For posts it is about as durable as the Oak. It is very valuable for rafters, railroad ties and framing timber.

It grows best on moist ground but will do well anywhere on our rich prairies. I have seen it in thriving condition on the sandy lands of Minnesota and also in like soil in Michigan.

Mr. Bryant, of Princeton, Illinois, has a fine grove of it, and wherever planted it seems to give satisfaction.

It is well to plant this where you wish to continue a row of the European Larch through wet ground. They are so much alike in habit and form that the difference, from a distance, will hardly be noticed. It is heavier than the European Larch and makes much better wood.

EUROPEAN OR SCOTCH LARCH.

I have hitherto written and said much on this tree, because I believe it is by far the most profitable tree that can be raised. But a few weeks ago I saw the beautiful Larch grove of Mr. Scofield, at Elgin, Illinois. Though but fourteen years old, many of the trees were large enough for railroad ties. Planted side by side, and at the same time, the Larch beat the Soft Maple in growth at least two to one; and being twice as valuable, one acre of it would be worth four of the Maple. Black Walnut trees of the same age, were only one fourth as large. It is the most beautiful tree on earth. Born on the Tyrol Mountains of Austria, it has a hardiness, boldness, and beauty, which make it the most popular tree of Europe. It does not waste itself in side branches, but concentrates in the trunk, which is generally straight as an arrow. It is well adapted to dry soils—rough, bluffy, broken, or sandy land. I have a brother-in-law, who, thirty-five years ago, assisted the Duke of Athol in Scotland, in planting a large portion of the almost worthless highlands with this tree. The ground was so steep and broken that it could not be plowed, and trees a year or two old were planted with iron dibbles. It seemed then a very unpromising undertaking, but three years ago a friend brought the news that eleven steam saw mills had been erected, and railroads were run into the valleys; and the amount of timber shipped from the tract, was enormous, and even now about four hundred trees are left to the acre. But many of those cut down were large enough for masts. The land, when planted was worth a shilling an acre, but thirty-five years after, it was worth $2,500 per acre.

Though of such a rampant growth, this tree is famed for durability. A Scotch forester informs me that he saw railroad ties taken up in Scotland perfectly sound, after they had been down twenty-five years. An Englishman, returning from a trip to England, told some of our leading tree planters in the West, (who charged him to ascertain their durability,) that they lasted twenty-seven years. Oak ties last six or seven years. I have a piece of Larch limb, the size of my finger, which lay eight years in the grass, on Mr. Scofield's place, and it is perfectly sound yet—the bark not even rotted, nor loosened from the wood.

It is thought by many that this tree is not more durable than many others. Young trees full of sap and of rampant growth have been set out green and have rotted. The sap wood of the Cedar rots readily also. The lower limbs of the Larch, when matured, seem indestructible. The reason why this timber lasts so much better in Europe is its maturity. Slender stakes cut from dense forests have but little sap, hence their durability in the Swiss vine yards.

This tree is planted to a greater extent in Europe than any other, and it must be planted here by the million to meet the ravenous wants of our railroads. An acre of land will raise 2,500 ties in twenty-five years. The B. & M. R. R. now pay $1 apiece for their ties. They cannot be less in twenty-five years. Forty acres of Larch would then be worth $100,000, but ties will probably be worth twice as much then as now, which will give twice that amount, or $200,000. But, to keep in the bounds of reason, we will say that forty acres will be worth $50,000. What better or surer investment can be made? This timber receives a high polish, is valuable for furniture and its rapid growth will cause it to take the place of Pine to a great extent. It must be very superior for weather boards and all kinds of lumber subject to exposure. It has already in Europe a high place in the arts.

A Scotch friend informs me that when the Duke of Athol died, true to his great life work, he showed his preference to his favorite tree by ordering his coffin to be made of it. No varnish or paint was used, but the material itself received such a high polish, under the hands of skillful workmen, that the visitors at the funeral saw the reflection of their own faces on the lid of the coffin.

As it has been said the Larch will not grow in Nebraska, I give an extract of an editorial correspondence to the Prairie Farmer, found in the number for July 27th, 1872:

"At several points we saw small lots of European Larches growing, one year planted, that were doing finely, and growing as well as in other places, and when their prospective value for fence posts and ties for building new railroads and re-tying old ones, is taken in with their advantages for fuel and shelter, they are probably the best trees that can be extensively planted in the State. Every settler should not neglect to set out a number of these trees at once, as their product will be needed as soon as it can be produced."

Several other kinds of coniferæ are planted, but I have aimed at the most hardy and profitable. The Balsam Fir is a failure. The Cedars are slow growing and suffer from drouth more than the kinds named above. It is well enough to try others by way of experiment, but I am satisfied that I have given those best suited to our wants.

BEST DECIDUOUS TREES.

SOFT WOODS—COTTONWOOD.

Though much is said against this tree there is no variety which so much encourages timber culture. The ease with which it is propagated, the rapidity of its growth, and adaptation to every kind of soil, commend it to general favor. Suppose it does scatter seeds, trees are what we want, and if we don't plant it our neighbors will, and our lands will be seeded at all events.

Trees of quick growth must be planted for boards and fuel, and this variety is worth forty per cent as much for fuel as hickory. We need wind breaks and must have them to defend our crops and break the force of the winds. Plant Cottonwoods around your farms, and at your leisure plant Evergreens, Larch or other desirable trees, and when they are large enough and are well established cut away your outer row. Many trees which alone could not endure the vicissitudes of our climate, would thrive under the protection of this hardy native. It is at home in the extreme north of our country. Near the northern line of Minnesota I saw one this summer eight years old and a foot through. It climbs the rocky bluffs of the Missouri; is at home on sand or clay. The tree for the million; the poor man's friend; a very profitable tree to plant. Trees fifteen years old wlll often produce a cord of wood apiece.

THE WHITE WILLOW.

Is extremely hardy, growing well in the latitude of St. Paul. It is very thrifty. I saw one tree a few months ago, twenty-five years old and 14 feet in circumference. There is no better material for fencing and wind break combined, unless we except some of the Evergreens. It is propagated from cuttings which will grow of almost any size, but they need the best of care. Hedges are now made in this way: Cut stakes six feet long and two inches thick, dig a trench two feet deep, set the stakes by line, pack the soil firmly about them, and then mulch heavily; set ten inches apart, and fasten the tops with wire and staples. You have then a fence the first year, which is constantly improving, and from this you can soon cut stakes for more fence.

THE YELLOW WILLOW

Is next in value to this and in winter its highly colored branches form a pleasing contrast with other trees.

There are other kinds of the soft woods which might be mentioned, but I am convinced that those named will be found the best unless we add the Silver Poplar, a much firmer wood than any of the above, very thrifty, but objectionable on account of sprouting.

LOMBARDY POPLAR.

It may savor of temerity to recommend this tree, but its real merits have been strangely overlooked. Marcus Bull in his carefully prepared table of the comparative value of the different kinds of wood for fuel, finds this worth two-thirds as much as Hickory. A man in DeKalb County, Illinois, cut twenty cords of wood from a single row ten rods in length—two cords to the rod; the trees were twenty years old.

We have only the male of this tree in the United States, and this has been propagated from cuttings to such an extent that it is removed farther and farther from the parent stock, and as a result we can make it live only about twenty years. Will not some Horticulturist or some visitor to Europe get us a new stock of this tree from Lombardy? Its tall, columnar growth is very imposing, and in its native soil and climate it is said to live a hundred years.

It is valuable for square timber, scantling and boards. Though it decays soon when exposed, yet there are many uses to which it can be placed with advantage. It is a very thrifty tree growing 80 feet high and two feet through in twenty years.

HARD WOOD TREES.

SUGAR MAPLE.

This is one of the most beautiful ornamental trees we have. A slow grower at first, and yet I have seen them in Illinois nearly two feet through at 35 years of age, so that it is possible in one's life time to obtain sugar from them.

THE SOFT MAPLE

Is too well known to need much comment. It is very easily propagated. The seeds ripen in May and can be immediately planted, and they grow one or two feet the same year. A valuable tree for shade, wind breaks, fuel and furniture.

THE ASH LEAVED MAPLE

Is very thrifty when young, but seems to reach its maturity soon. I have seen them growing in Iowa and Minnesota by the thousand, but never saw a very large or very fine tree among them. Yet no tree so much appreciates good culture. The wood is valuable in the arts and for fuel, and cultivation will probably make it a much finer tree, than where it grows in its native forests.

BLACK WALNUT.

The lumber from this tree has long been bringing almost fabulous prices for furniture, and should be planted largely. But Bryant says it is "a bad neighbor to many other trees and should, as far as possible, be grown by itself. It is unfit for a screen to an orchard. Apple trees will not live long in its neighborhood, and the same is probably true of some, if not all other fruit trees." My own observation confirms the above, and I think it is also a bad neighbor to itself. Planted closely it does not seem to thrive well. This is also true of the White Ash and Elm, as I have seen them in Illinois plantations; these trees need room and would probably do best as road trees. The Black Walnut is very valuable as a nut bearing tree. The same is true of the

BITTERNUT,

Which, though not quite as thrifty or quite as valuable for timber, ought not to be overlooked.

THE CHESTNUT

Has a varying record in the West. In many places it seems a decided success, and again it sadly disappoints the hopes of those who invest. It requires a dry soil; and should not be omitted in a collection.

THE BEECH

Is a noble tree, and though, like the Hard Maple, of slow growth, it should be planted to some extent at least. In the nurseries of Rochester I saw several sprouts of this tree, and among them the Blood Leaved Beech; this, grafted on the common stock, makes a fine appearance in contrast with the deep green of other trees.

HICKORY.

This tree is indispensible where the toughest and strongest timber is required. It is of great value for spokes, axeltrees, etc. For so valuable and hard a timber it is not a very slow grower; when once fairly started it does well. Its foliage is beautiful. I have dwelt on the nut bearing trees because their timber is as valuable as any, and the fruit is an item worthy of our attention. To a boy's eyes these are the most attractive trees on earth, and in our plans we should have some reference to their preferences. We cannot forget the nutting times of boyhood. Every charm should be thown around the homestead, and our sons should be taught that there is no vocation which affords such scope for thought, improvement and comfort as the farm.

THE HONEY LOCUST,

Being a native of the State, ought not to be disregarded. On account of its unique appearance, its rich foliage, and great thorn clusters and long seed pods, if it was some expensive tree from some foreign soil it would be in the greatest demand. It is fast growing and valuable for timber and posts.

THE WHITE ASH

Is in great demand in the construction of machinery, for fork and hoe handles and the numerous other demands of the arts. The Blue and Black Ash are not to be overlooked.

THE OAK

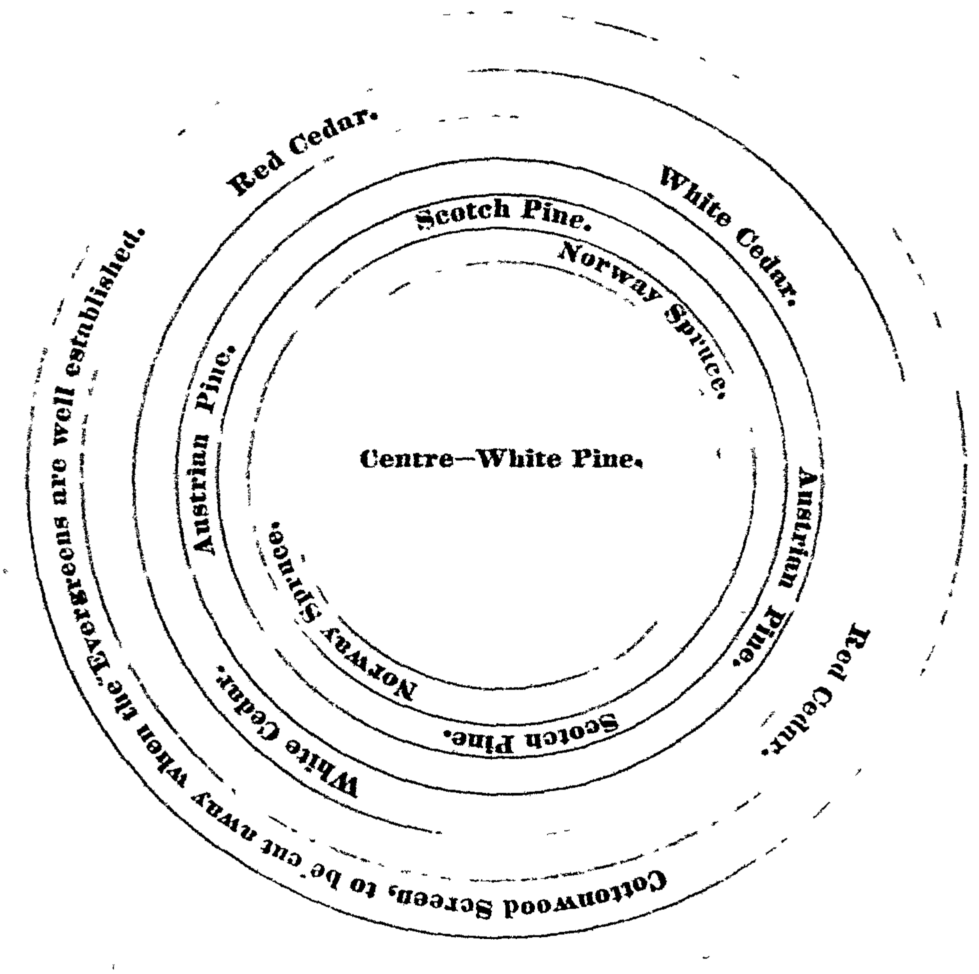
Is a noble historic tree, a symbol of strength and grandeur. The White variety is in the best demand. The Burr Oak is best for posts, but the Black Oak ought not to be overlooked. When young it is very tough. It grows nearly twice as fast as the White, and is of nearly equal value for wood.

THE ELMS

Are fine shade trees and their timber of sufficient value to repay the trouble of cultivation.

AN EVERGREEN HILL.

This illustration is designed for planting Evergreens on a level piece of ground so as to give the appearance of a hill. The same order can be used for crowning an eminence. The tallest trees are planted in the centre, the less thrifty next, and so on till you reach the outer row. The group will have a beautiful and symmetrically rounded appearance. The rows are eight feet apart, and the trees eight feet in the row. The center a little thicker to make them shoot higher.



Norway Spruce.

White Pine.

Scotch Pine.

Austrian Pine.

Main Field, 60 Acres.

Row of Larch, Soft Maple, or Cottonwood, on the road, 10 feet from line in the road; trees to be 8 feet apart in the row.

Norway Spruce.

White Pine.

Scotch Pine.

Norway Spruce.

White Pine.

PLAN FOR LAYING OUT 80 ACRES.

Road on south and west. Besides the wind breaks, 20 acres are devoted to trees and orchard; orchard to contain 4 acres of apples, and one each of pears and cherries. Peaches to be planted as marked on plan. Small fruits as follows, commencing on east side—one row Lum's Fall Bearing, one row Ohio, one row Elm City, one row Davidson, one row Dolittle, three rows Seneca, three rows Philadelphia Raspberries. Nearest the house plant Strawberries.

Plant five or six kinds of grapes; be careful and plant some good keepers. Leave a good plat of lawn for grass. Set out a variety of trees—catalpa, tulip, chestnut, ect. Set out a good variety, but not too thick.

This is only one plan among a hundred which might be used.

Row of Sweet Cherries, defended from the sun

Evergreens.

Evergreens.

Evergreens.

Five acres Deciduous Trees.

Ash Leaved and Soft Maple.

Hickory and Honey Locust.

Two or three rows Peaches

Grapes.

House & Lawn grouped with Trees and Shrubbery.

Five Acres of Orchard

Small Fruits.

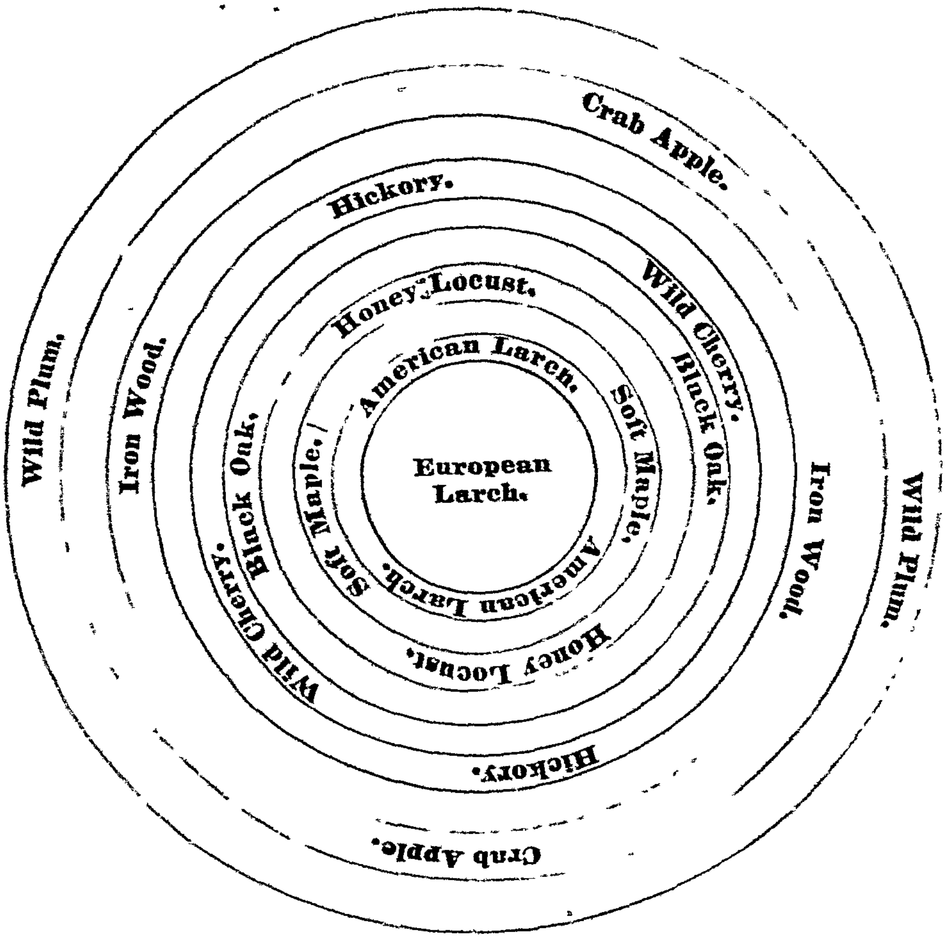
Five acres EUROPEAN LARCH.

Norway Spruce.

Larch on the road.

DECIDUOUS MOUND.

This plan is simply suggestive. By planting the trees in the centre thickest, they can be made grow the highest. Perhaps the kinds selected may not be the best, but the plan is a good one for giving diversity to a level tract of land.



COTTONWOOD OR LOMBARDY POPLAR ROW.

WHITE CEDAR. ANOTHER ROW ON EACH SIDE, OF RED CEDAR, MIGHT BE ADDED.

AUSTRIAN PINE.

SCOTCH PINE NEXT TO SPRUCE, AS RAPID GROWER.

NORWAY SPRUCE.

TWO ROWS WHITE PINE, PLACED IN THE CENTRE BECAUSE VERY FAST GROWERS.

WHITE PINE.

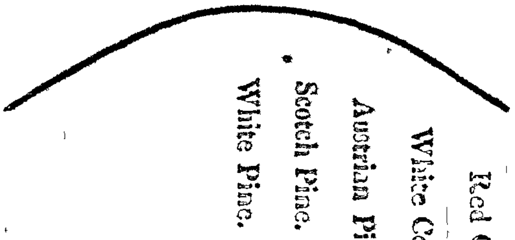
NORWAY SPRUCE, NEXT THRIFTY TREE.

SCOTCH PINE.

AUSTRIAN PINE.

WHITE CEDAR.

ROW OF COTTONWOOD, TO BE CUT AWAY WHEN THE HEDGE IS OLD ENOUGH.



Showing the curved top and relative height of the trees.

THE ROUNDED WIND BREAK.

The accompanying plan was suggested by observing the different Evergreens as they grew side by side. I have shown this plan to several tree-planters, and it has their approval. A clump of Evergreens can be planted thus anywhere in the field to relieve a dead level; and by observing the same order at the ends, you will have a body of trees in almost perfect symmetry.

The rows may be from 8 to 12 feet apart.